GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

The Gas Section at the Fair.

THE British Industries Fair in Birmingham is now in full swing; and there is general agreement that the centrally placed Gas Section is a finely organized and attractive component of the huge display. Visitors will be there from all parts of the country—in fact, of the globe. Across the seas they want to know what we are doing. A number of our French gas friends have been over to inspect the goods in the spacious halls, and while here they are investigating what is being done in this country in the matter of training young men for the work of the gas industry. But about the Gas Section. It is excellent; and there is assurance that it will effect its purpose. We want other industries to see what our industry can do in the service of the community and in that of production. They will find it demonstrated. We want the message as to the universality of gas application in homes, factories, trading establishments, and indeed in all places where light, heat, and power are required, to reach manufacturers and traders, no matter the particular sphere of the world's work in which they operate. They will receive the message by inspecting what the manufacturers of the gas industry, the Gas Department of the Birmingham Corporation, and certain of our organizations have to show them. Many of those who visit the exhibition will be concerned as architects and builders; there are practical lessons for them. Many who enter the section, though engaged in other manufacture or trade, and therefore in quest of knowledge, will be also concerned in local government. Certain of our Associations have something to show them in respect not only of the primary product, but of the utilization of the industry's secondary products, which will be of administrative value to them. In short, there will be no person among the multitude who will pass through these large halls filled with the products of British industry who does not want light and heat, and in some cases power; and therefore for everyone each group of exhibits in the Gas Section possesses something to interest—something that represents the latest achievements in design and economical and efficient operation. The great variety is seen from our descriptive article. Everything is well staged and invites the closest and most critical inspection. The gas industry is greatly indebted to those who have taken part in the organization of this grand demonstration, and who have patiently and assiduously done the "collar work." The same applies to the manufacturing contributors. The industry will be proud of the demonstrative result, assertive as it is, of high standards for all purposes. Visits are being paid to it from every part of the industry. Gas administrators, engineers, managers, secretaries, and salesmen are to be seen, and will continue to be seen, there daily. To the Birmingham Gas Department—Mr. A. W. Smith and Mr. R. J. Rogers particularly—is due the gratitude of all in the industry.

Method and Manners.

WE have before us two pamphlets, both headed "Can Gas Be Manufactured and Sold at 3½d. per Therm?" One is by Mr. George Helps, of Nuneaton; the other is a reply to it by the Gas Industry of Scotland. To examine in detail the points in these brochures would occupy more columns than we should care to devote to the subject with which they deal. But briefly the answer to the question is that no one is yet selling gas suitable for general distribution, and for all town purposes, at 3½d. per therm; and not even on paper, much less at Nuneaton, has the protagonist of very low-grade gas—gas of (say) 200 B.Th.U. per c.ft.—succeeded in convincing the experts of the gas industry that it can be done in present circumstances, or rather that the proposition is in all respects a practicable one for town gas supply. When on one occasion there was a chance of doing something in the way of demonstrating that there was soundness in the project, the issue was a quarrel, and an unsuccessful High Court action. However, there is an aspect of this wordy and (so far as Mr. Helps is concerned) boisterous dispute to which we wish to draw attention, in the hope that our Nuneaton friend may be induced to adopt new tactics or suspend his campaign until Nuneaton offers definite confirmation by a 3½d. therm, and the satisfaction of the consumers, as expressed by a magnificent accretion of business.

As said above, Mr. Helps has not so far succeeded in carrying conviction to anyone in the gas industry. Nevertheless, it is his professional colleagues that he has to convert before he can make headway, if there is anything really good in the process, which, for town supply, is more than doubtful. But having failed where failure is most disastrous, what has he done since? He has as a last resource taken to making appeal to a public incompetent to weigh and assess his contentions, in the hope that, in some unfathomable or subtle way, they will bring influence to bear upon the gas industry, and insist upon its seeing the error of its ways as pictured by an intelligence obsessed by very low-grade gas. Whenever occasion presents itself, Mr. Helps writes to the newspapers, pointing out the error, and parading figures as to what can be done, but which he himself has failed to accomplish in his own town. Now he has indulged in pamphleteering, and in making local attack—as in the pamphlet which has had wide distribution in Glasgow. In this he essays to show that that city could do what he himself has not succeeded in doing at Nuneaton.—sell gas at 3½d. per therm. All that is written in the brochure, whether it is worth much or little, is nothing short of an indictment by Mr. Helps of Glasgow administration and management in respect of the policy of making and distributing a gas of 475 B.Th.U., as compared with one of (say) 200 B.Th.U., and containing about 55 p.ct. of incombustibles. What good has he achieved by this?

None. To our mind, however, the act reveals more than we care to say. But what we do not mind saying is that it shows something which fortunately, within our memory, is unprecedented in the gas industry; and we are glad we do not know any other member of the gas profession who would have taken a similar course. For one professional man to set himself deliberately and gratuitously to attack the operations of a gas undertaking the executive management of which is in the hands of a professional colleague is, in our judgment—and this is the view of the British gas profession generally—an act that is discourteous and offensive in the last degree. If it had been successful, the only effect would have been to worry and harass the management by fomenting public agitation. But the public are suspicious of the man with an axe to grind, though there are exceptions to the rule. And Mr. J. S. Simpson, Secretary to the Scottish Citizens' Union, supplies an example by the ease of his misleading.

The great mistake that Mr. Helps has made is that he believes, by some inscrutable favour of Providence, the sole capacity and intelligence to see the truth of very low-grade gas for public distribution and sale has been bestowed upon him, and denied to the whole—perhaps we ought to say practically the whole—of the other members of the British gas profession. In this matter he places himself upon a Nelson-high pedestal, and sees the rest of the gas profession as pigmies—always and only so far as low-grade gas is concerned. In his 3½d.-per-therm pamphlet, he gives (if his words have any meaning) a fair indication of the contempt in which he holds his professional fellows. We quote his own words:

> There is a period in the history of any industry with great fundamental changes before it, when the majority, due to inexperience, is unable to judge of such new proposals—in fact, the majority is usually altogether incompetent. It may be fairly said that the mentality of the majority in any industry towards any new movement is always unfavourable to begin with. The larger the collection of individuals running a business, the worse the business is likely to be run. Such a collection of individuals is the arch enemy of progress; and the National Gas Council and the "B.C.G.A." are no exceptions to the rule. From one point of view, these organizations would appear to be formed by the incompetent for the permanent upholding of incompetence.

Those passages are eloquent of the belief of their author in his own competence as a judge of incompetence in a mass of others. It is these so-called incompetents whom he finds standing shoulder to shoulder in the British gas profession, and whom he has failed to convince that his low-grade plans are right. Therefore, he tramples logic under his feet, and proceeds to appeal to the still less competent in matters appertaining to gas by writing to the public Press, and preparing a pamphlet for public consumption plentifully larded with platitude and statistics which, if gas engineers are not convinced by them, are not likely to appeal to, or be understood by, the people. Meanwhile, Nuneaton, according to the latest circular we have received, pays 1s. 6½d. per therm (gas only) in the case of prepayment consumers, and the same price is charged to ordinary consumers, with lower prices in special circumstances.

Despite the objectionable methods of propaganda adopted by Mr. Helps, if experience, facts, and reason warranted, the gas industry would not be slow to adopt a process—not necessarily the Nuneaton one—for making low-grade gas. But they do not give the necessary warrant. The pamphlet issued by the Gas Industry of Scotland shows this. When they discard Mr. Helps' per-ton basis, and take sale of therms as the basis—adopting 72 therms for the comparative calculation—it is seen that to provide those therms is practically no more costly by straight coal-gas manufacture than by complete gasification, with 180 therms as the production per ton. With coal at 27s. per ton, for producing 72 therms by complete gasification 8 cwt. of coal is required, costing 10s. 10d., while the revenue from tar is 1s. 8d., with no coke available for sale. In coal-gas manufacture, with coke at 30s. per ton, a revenue of 15s. is obtained from that commodity, and 5s. for 12 gallons of tar. Charging out the 72 gas therms at the same price, it is easy to see that deducting the cost of coal (27s.) from the coal-gas and secondary products revenue, and the cost of coal (10s. 10d.) from the complete gasification revenue, there is practically an equality in the gross profit figures. In the case of the South Metropolitan Gas Company, the net cost of coal last year was 10s. 7d. per ton, producing 73·5 therms of straight coal gas; to obtain the same number of therms from the same coal by complete gasification would require a quantity of coal costing, at 27s. per ton, within two or three pence of the 10s. 7d. which was the net coal cost of the South Metropolitan Company last year, but they had not an enormous quantity of incombustibles to store and distribute, as in the system advocated by Mr. Helps. It would thus have been no profit to them or their consumers to have completely gasified the coal instead of distributing a 560 B.Th.U. gas.

We are sorry there has been any need for remonstrance regarding a matter of tactics and good taste. Those tactics will not have their designed result; but, we fear, they have already had, and will continue to have, the effect of causing estrangement between their author and his professional colleagues. Because expert gas men are unwilling to endorse Mr. Helps' proposals, is no reason why any one of them or any undertaking should be subject to his attacks. As we have said, this is something new in the professional history of the gas industry; and we hope there will not be repetition. What we would suggest is that Mr. Helps should now wait until he has proved at Nuneaton that he can make and sell gas at per therm by his process cheaper than anyone else in this country can by some other method, and that there are no attendant disadvantages. Then will be the time for a revival of his championship.

Commercial Gas.

WHEN one reads a speech such as that which Mr. W. G. Bradshaw delivered to the proprietors of the Commercial Gas Company last Thursday, it is impossible not to be struck with the variety of its elements as compared with the addresses which at one time came year after year, with almost monotonous sameness, from chairmen of gas companies. The fact is a reflection of change in circumstance, and of the constructive work which has extended the ramifications of business and reinforced the internal structure of gas concerns. In regard to the latter, in one respect the Commercial Company have taken example from the South Metropolitan Gas Company, by adopting the basic price and dividend system, with definite appropriations of profit between the three contributors to the fortunes of the undertaking—the consumers, the proprietors, and the co-partners. The saving to the consumers by reason of gas being sold (taking the average) below the basic price of 11d. per therm is equal to £148,647. One-third of this (the prescribed proportion for division between proprietors and co-partners) would be £49,549; but the Directors appropriated from net revenue the smaller sum of £41,465 12s., which allows £20,732 16s. to be distributed in an additional 1 p.ct. dividend (making 6 p.ct. for the year), and the other half goes to the co-partners. Thus in their aggregate part the proprietors and co-partners share and share alike in prosperity. This must contribute substantially to the stability of the internal structure of the concern; and it is to everybody's interest, including that of the consumers, to contribute to the conditions which will make the distributions as large as possible. As to the business of the Company, the characteristics of the district cause gas use to be very responsive to trade variations. It is gratifying to hear from Mr. Bradshaw, with his interests in the banking world, that there is an improved tendency in trade, and that the prospect for this year is a further materialization. The result of the past year was a slightly increased sale of therms, which constituted a record. Though the increase was small distributed over all branches of the business, there is interest in learning the contributions to it. Compared with the previous year, trade consumption (subject to discount) showed 5·53 p.ct. increase; general consumption (subject to discount), 2·5 p.ct. increase; ordinary domestic consumption, 1·97 p.ct. decrease; and prepayment consumption, 0·63 p.ct. increase. There are other features of the year which are

good, and among them is the excellent working, for which the Chairman acknowledged indebtedness to the Chief Engineer (Mr. A. E. Williams) and his assistants. It is noticed that, partly due to the high price of oil, the make of carburetted water gas for last year was the lowest for the past thirty years—only 10½ p.ct. On the other hand, during the year additional contracts, at reduced prices, were made for coal up to June next year. The prices of coal and oil have a marked effect on the ratio of coal gas to carburetted water gas in a year's operations of the gas industry. The colliery owners and the oil companies should note the fact—particularly at the present time.

Gas and Electricity Contributions to the Rates.

WHEN the gas supply of a town is conducted by private enterprise, and the electricity supply by municipal administration, and there is a profit on electricity, the boast is made that this is largely applied to the reduction of the rates, which is given as a reason for the ratepayers supporting with their custom the electricity concern. Of course, under the Electricity Supply Act of 1926, the amount which can be so appropriated is only equivalent to 1½ p.ct. on the outstanding capital of the undertaking; and after March 31, 1930, even this will not be permissible unless the reserve fund amounts to more than one-twentieth of the aggregate capital expenditure. But ignoring this new limitation for the moment, when the municipal conductors of an electricity concern proclaim to the gallery for the sake of applause that the electricity concern is giving relief to the rates, they conveniently overlook the contribution that the local gas company and their customers are making to the meeting of municipal expenditure. The point was well made by Mr. George Geen, J.P., when presiding at the annual meeting of the Newport (Mon.) Gas Company, to whom we are indebted for the Newport clause, which forms a precedent for prohibiting a municipal body doing anything to prevent tenants of any premises in which the local authority are concerned from gratifying their own desires as to the use of gas or electricity. The municipal competitors are now urging as a reason for patronizing their commodity, that, whereas the profits of a gas company are dispensed as dividends among shareholders, those made by the municipal electricity undertaking are voted to the relief of the rates. Mr. Geen effectively sweeps this aside by pointing out that, since the first accounts of the Newport electricity undertaking were published, the Gas Company have contributed to the rating authorities a sum of £92,792, which is approximately £40,000 more than the aggregate paid in the same period by the electricity undertaking as rates and as contributions to the relief of the rates. The point is one which can be made elsewhere with similar excellent effect.

Radiation.

A VOTE by show of hands at a meeting of shareholders is not always a fair expression of the views of the proprietary as a whole. When anything of an unusual nature has occurred concerning the business—particularly when there has been agitation among the shareholders—the malcontents are almost certain to be in a majority at the meeting; and it does not always follow that those who can be so described are those who see that the best interests of the undertaking may not necessarily be served by drastic measures, but that the *summum bonum* is to be realized by taking a moderate and diplomatic course. That is what has happened in connection with the turbulence that has been recently raised in Radiation affairs. It must be obvious to all who have followed the trouble closely that the Radiation Company has been very successful not only in connection with the main gas apparatus business, but in the subsidiary branches, the products of both of which are distributed to many quarters of the globe. The business has been developed on merit, and merit has been promoted by the men whose lives have been spent in this work, and who are therefore specialists. What has been achieved was sketched in the address of the Chairman (Mr. H. James Yates) at the meeting of shareholders. The shareholders know how rapidly the business has expanded, and how profitable it has been under the existing direction and management. Thus, as any unprejudiced person can see, the most sensible course, in the interests of the proprietary and customers alike, is the adjustment of such conditions as have proved to be difficulties, and which (paradoxical as it may seem) were due to the growth of prosperity. That, it appears, is the view of a large proportion of the shareholders. Although the motion for the adoption of the report was, on a show of hands, rejected at the meeting, the result of a poll of the shareholders is that 898,246 votes were recorded in favour of the motion and 444,851 against—approximately two to one. The best thing that can happen now is that there should be a settling-down to work again on a mutually satisfactory basis.

Research and Commercial Potentialities.

THE annual report of the Committee of the Privy Council for Scientific and Industrial Research is a mine of interest. It shows the numerous ramifications of the work that is in hand, which should, as development is made, have a vast influence on our economic affairs, and make for national and industrial progress. There are several references to the explorations of the Fuel Research Board, under the energetic direction of Dr. C. H. Lander; low-temperature carbonization bulking largely. We devoutly hope that the arrangement entered into between the Government and the Gas Light and Coke Company for the testing of a plant capable of producing 100 tons of smokeless fuel per day will finally settle the question as to whether there is any chance of commercial success for the low-temperature system, and whether there is anything in such a process for the gas industry. People have been waiting many years for the determination of a question which, we think, would have been settled long ago if such success had been within measurable distance; but year after year they have been met with the announcement of the maintenance of the *status quo*—that technical success was a reality; commercial success an uncertainty. The trouble, of course, is that, having regard to the nature and competitive position of low-temperature products, one set of market conditions could easily constitute commercial success, but it would take little in the way of a change in those conditions to transfer success to loss. However, the report urges those concerned not to despair. It is said that many exaggerated claims have been made on behalf of low-temperature carbonization; and the natural result of unfulfilled prophecies has been that in many quarters undue pessimism prevails. The Advisory Committee "consider that neither extreme pessimism nor optimism is justified, since we have yet to learn the facts on which sound judgment of the commercial success on a large scale of any low-temperature process can be based." We have, therefore, to suspend definite judgment.

Another matter which touches the gas industry rather closely in respect of the possible effect upon tar is the conversion, under the Bergius system, of coal into light petroleum products. Investigations have been made in Germany by the Department into the treatment of selected British coals with hydrogen under high pressure at moderately high temperatures. The results of the experiments then made have been confirmed at the Fuel Research Station; and there is no doubt that, by the treatment, a large proportion of the coal substance can be converted into liquid fuels. But as in low-temperature carbonization, so in this process of coal hydrogenation, it is impossible yet to assess the commercial value. While making that intimation, the Committee shrink from saying anything that is not encouraging. It is remarked that, for the first time, "we can envisage, on the sure basis of experimental results, the production from coal of liquid fuel in sufficient quantity to supply all the requirements of motor transport, should the natural supplies of petroleum fail." As was mentioned last week, Mr. Thomas Hardie has suggested that the gas industry should look into this question of the hydrogenation of coal to see whether it

could be fitly incorporated in gas-works operations, so as to occupy otherwise idle plant in the summer time.

Among the voluminous work in hand, there is the investigation into the reactivity of cokes, for which there has been worked out a laboratory method of giving a numerical value for reactivity, which, though at present purely empirical, gives consistent results, and enables comparisons to be made. The National Federation of Iron and Steel Manufacturers are lucky. They have established Coke Research Committees at Sheffield, Newcastle, and Glasgow; and the Advisory Committee of the Department recommend a grant of £2000 towards their researches. Tars are having their virtues explored, with the view to further developments, which naturally all will welcome, as successful results must advance commercial values, and confer benefit on mankind. The possible utilization of the phenols from low-temperature tars is being examined in two directions: (1) As "anti-knocks" in petrol for internal combustion engines; and (2) as germicides and disinfectants. It will not be good news for the germ world to learn that a notable rise in germicidal potency is produced by chlorination. Work is also proceeding on coal tar in connection with fluorene, acenaphthene, and perylene. We are not particularly concerned in these matters; but it is a satisfaction to know that research is penetrating farther into the complex constituents of tar. With the Tar Distillers' Association, there is co-operation in investigating the properties of pitch required for the manufacture of briquettes. There has been trouble for some time over the lower value of vertical retort pitch as a binder for briquette making. Among other matters, research is going forward into the subject of air pollution; and a comprehensive organization has been instituted in connection with the Department to see what can be done in the matter of obviating river pollution. To the gas industry, which has so frequently been attacked in respect of its alleged river-polluting proclivities, it will come as a relief to find that it is estimated by the Ministry of Agriculture and Fisheries that 70 p.ct. of the present damage to fisheries is caused by sewage. Most industries, of course, contribute to the pollution of our rivers and watercourses; but the beet sugar industry is now being accused of having one of the most malignant of trade effluents. Though everything ought to be done to end or minimize the pollution of rivers, streams, and other watercourses, there is a little feeling of satisfaction, after the "slating" the gas industry has been subjected to, that a rather modern industry is far from being spotless in this regard. High-pressure gas research and metal corrosion investigation are, among other work, also promising of value in due season to the gas industry.

Prepayment Charges at Portsmouth.

IN a survey of current electricity sales development effort, it is noticed that such methods as assisted wiring, hire-purchase, and so forth are being actively pushed in the hope of tempting prepayment gas consumers to enrol themselves on the books of the competitors. So far as lighting is concerned in some areas, there has been partial success. Another new system is gaining favour in the form of a two-part tariff. A case recently noticed, and which has gained adherents, is the charging of 1s. per week, which makes £2 12s. a year, and which represents the fixed primary charge to cover overhead costs for everything in a prepayment meter supply (lighting, washboiler, and iron); and then a secondary charge of 1d. per unit for all current registered by an ordinary meter. The electric prepayment meter is an expensive piece of apparatus; and the difference between its cost and that of an ordinary meter makes an appreciable difference to the installation outlay. These conditions suggest that in some areas reconsideration will have to be given to the additional charges made to prepayment gas consumers, to ascertain whether it is not possible to modify them. We should imagine that one of the lowest in the country is that which was announced at the meeting of the shareholders of the Portsmouth Gas Company on the 16th inst. The new prices there to ordinary and prepayment consumers are: For ordinary consumers, 7½d. per therm; for prepayment consumers, 8½d. per therm where meter only is installed; and for prepayment consumers, 8⅝d. per therm, with meter and installation. In addition, discounts are allowed up to a maximum of 15 p.ct. according to the quantity of gas consumed. It will be seen that the low charge of 1d. per therm extra is made where a slot meter only is fixed, and 1¼d. per therm with meter and installation. We do not know exactly what the installation comprises; but in any event the prepayment excess is a model of moderation. As a matter of fact, the prepayment consumers at Portsmouth will at the prices named be getting their service at an overall cost of not more than ordinary consumers are paying in London, and the ordinary consumers will be rejoicing in a lower payment. We know of authorizations of maximum excess charges for prepayment consumers which are double and treble those which are about to be charged at Portsmouth under the new scale; but, of course, authorized excess is not always the actual charge. In view of the developments in the electricity industry among the poorer class of consumers, the subject of the prepayment excess is one which will have to be looked into by some gas undertakings. Interest would be aroused in the question if gas managers who can claim that their excess charges are equal or below those at Portsmouth would let us hear from them.

Gas Tariffs.

The Central Executive Board of the National Gas Council give the information that the report of the Committee on Gas Charges has been received, and will be fully discussed at the next monthly meeting.

Coal-Selling Agencies.

Lancashire and Cheshire having come into the Three-Counties Coal-Selling Scheme, it is now known as the Five-Counties Scheme, the united members in which will have control of a production of about 100 million tons a year. One condition of the scheme is the regulation of output, which, it is pointed out, will produce for colliery managers a problem altogether different from what they have had to deal with in the past. What will now be expected of them is that they will have to work to the same costs of production with a reduced output. We see the coal exporters are discussing their position in connection with the scheme; and it looks as though they will have to come to an agreement to co-operate with the owners on defined lines.

Sulphate of Ammonia Values.

It will be seen from the minutes of the Central Executive Board of the National Gas Council, as published in a later column, that they have been giving consideration to the serious position of the prices received for sulphate of ammonia. There can be no question as to the desirability of everything possible being done to cheapen recovery; and, therefore, it is interesting to learn that the necessity for research being instituted with this in view was very much pressed at the meeting of the Board. The Effluents Committee of the Institution of Gas Engineers have been asked to consider the question, and to report their views to the Board.

To Popularize Household Coal.

Apparently the members of the Coal Merchants' Federation have "got the wind up." There are two things which are disturbing them. They do not like the campaign against the pollution of the atmosphere by smoke, and the destruction that the emanations of household and factory chimneys inflict upon our public and other buildings; and, in the second place, the march of gas in popularity does not meet with their approval. They, therefore, think the time has come when they must do something to popularize household coal, and to endeavour to stop its drift from use in the crude form. In other words, they want to stop the progress of scientific heating. The merchants have been holding a private conference at the Cannon Street Hotel; and no one who was not connected with their Federation was allowed inside the doors of the meeting room. The information, however, has been given that this resolution was passed: "That the Coal Merchants' Federation be given power

to co-operate with the Mining Association of Great Britain with a view to popularizing household coal." Obviously they do not intend this campaign to be a small and mean venture, for we learn that it is probable a joint meeting of the merchants and the Mining Association will be called at an early date to discuss the details necessary for intensive operations throughout the country. Another statement is that an agreement has been tentatively reached aiming at the reduction of the price of household coal to the level of pre-war charges.

Ventilation of Bathrooms and Geysers.

In their Act of 1926, the Bristol Corporation obtained a clause which empowered them to frame bye-laws making it illegal for anyone to have bathrooms without provision for ventilation, or to instal geysers without flue-pipes. The bye-laws are now available, and are reproduced in our "Miscellaneous News" columns.

Position of Unemployment.

During the discussion in the House of Commons on the Address last week, the Labour-Socialist Party proposed an amendment on the subject of unemployment. In the course of it, the Premier made a very interesting statement. He pointed out that to speak, as was usually done, of a million unemployed is misleading. The million are not permanently out of work. Something like half of them are occasionally in employment, and, though of the rest some are permanently unemployed, a considerable proportion have good hopes of getting employment—it might be in other industries. He also declared that the chief problem is one of transference from one kind of work to another, rather than any deficiency in the gross amount of work to go round. There are 500,000 more men and women at work now than before the war.

Coal Exports and Competition.

Our export trade in coal amounts only to 48·7 million tons per annum, excluding exports to the Irish Free State, as compared with 73·4 million tons in 1913. Exports to European countries, excluding Russia (pre-war Russian territory), amount to 37 million tons, as compared with 52 million tons in 1913. Each of the importing countries is consuming more coal than in 1913; but we are supplying them with less, which shows that they are purchasing a large proportion of their requirements from other coal-producing countries. An interesting point is that Poland exported to destinations other than Germany last year an amount of coal which exceeded its exports in 1925 by more than 5 million tons. This indicates the extent to which Poland has been able to retain the trade obtained in 1926, when the British mines were idle for seven months.

PERSONAL.

Mr. WILFRID WASTELL, Secretary of the South Suburban Gas Company, has been appointed Commercial Manager and Secretary of the Company.

Readers will learn with regret of the illness of Mr. H. H. EVEREST, who, previous to his retirement two years ago, had been Manager of the Whittington Gas-Works, Chesterfield, for over forty years. Mr. Everest was taken seriously ill at Christmas, and is still confined to his bed.

Mr. R. DOUGLAS, Technical Assistant to the Workington Gas Department, has been appointed Assistant Engineer and Manager to the Kendal Corporation Gas and Water Department. Mr. Douglas is an Associate Member of the Institution of Mechanical Engineers, and has obtained first-class Ordinary Certificates in Gas Engineering and Supply, and also a first-class Higher Certificate in Gas Engineering (with distinction). He received his training at Workington.

OBITUARY.

FUNERAL OF MRS. ARTHUR VALON.

Amidst every demonstration of affectionate regard for the memory of Mrs. Arthur Valon, whose death was announced in our issue last week, her remains were laid to rest on Thursday afternoon last at Rusthall New Cemetery, Tunbridge Wells.

Representing the Institution of Gas Engineers, Mr. Leonard J. Langford, Engineer of the Tunbridge Wells Gas Company (member of Council), attended. With him, also representing that Company, was the Secretary, Mr. C. F. Catt. Other organizations, with which Mrs. Valon had association through the work of her husband, present at the funeral were Mr. C. Valon Bennett, of Rochester, representing the Southern Association of Gas Engineers and Managers; Mr. H. C. Head, of Winchester, Engineer of the Winchester Gas and Water Company; Mr. W. M. Valon, late of Stafford; and Mr. John F. Simmance, Honorary Member of the Institution of Gas Engineers.

It will be remembered that Mrs. Arthur Valon frequently attended the annual meetings of the Institution, and also the social gatherings in connection with the Evening Star Lodge (of which Mr. Valon is the respected oldest subscribing Past Master). Her charm of manner to all with whom she came in contact will always remain a cherished recollection to them.

His many acquaintances in the gas industry deeply sympathize with Mr. Valon in the great loss which he has sustained, and in encountering which he will have their sincere regard and support.

The death took place last Wednesday, in the Bute Hospital, Cumnock, Ayrshire, of Mr. JOHN O'NEIL, who for 28 years was Manager of the Cumnock Gas-Works. Mr. O'Neil, who went from Tranent to Cumnock, began his career at the Lochmaben Gas-Works, where his father was for many years Manager.

BRITISH INDUSTRIES FAIR GAS SECTION.

Its Origin—The Part of the Society of British Gas Industries.

There seems to be only a hazy notion among gas interests in the provinces as to how such a fine and representative display came about as is to be seen in the Gas Section of the British Industries Fair (Birmingham) to-day. The facts are these:

In July, 1926, Mr. F. J. Gould (of the Bland Light Syndicate, Ltd.), the then Chairman of the Council of the Society of British Gas Industries, accompanied by the Exhibition Committee (which had been appointed by the Council of the "S.B.G.I." to regulate the holding of gas exhibitions up and down the country) had an interview with the Executive Committee of the "B.C.G.A.," and announced their decision to support in future the following three exhibitions: The Smoke Abatement, Ideal Homes, and Builders' Exhibitions, and to exclude the "B.I.F.," Birmingham. This decision (which, we believe, was opposed to Mr. Gould's judgment) was received with regret by the "B.C.G.A." Committee and particularly by Mr. A. W. Smith, of the Birmingham Corporation Gas Department, who felt that the Society were losing a great opportunity. Eventually a meeting of the Council of the "S.B.G.I." was held—this in February last year—at the Grand Hotel, Birmingham; and, thanks to Mr. Smith's kindness, they were driven out to the Exhibition, where they spent the rest of the day, returning to the Hotel where there was an informal gathering. The matter was discussed; and it was felt that the absence of gas apparatus at the Fair, with a huge display of electrical goods there, would be a mistake. A few days after, Mr. Gould called a meeting of the Society's Exhibition Committee (the Chairman of which was then indisposed); and, after much discussion, they passed a resolution (to be forwarded to the Council) to the effect that, in the opinion of the Committee, all members of the Society should be at liberty to exhibit at the Fair—a former resolution, to the effect that the "S.B.G.I." should hold a co-ordinated exhibit at the Fair, being withdrawn. The Council confirmed the resolution, and every member was duly notified. The information was communicated to Mr. A. W. Smith; a meeting was called in July last, and a Committee was formed, with Mr. R. J. Rogers as Chairman. Every member of the Society was invited to exhibit; names rolled in.

ELECTRICITY SUPPLY MEMORANDA.

Cold and Damp All-Electric Houses.

GRASPING electricity undertakings do considerable damage to their interests by inducing municipal authorities to construct houses on the all-electric principle. The occupants of such dwellings can least afford the most expensive heating agent for their homes; and they do not hesitate to let the rest of the community know of their grievances—of the expense, of the discomfort experienced in cold and wet weather, and of the dampness of their homes through the inadequacy of heat. In creating such conditions and the consequent bad advertisement, the municipal electricity administrators are doing no good to the undertakings. We have heard before of the complaints from Liverpool—just as we have heard them from Woolwich, Cardiff, and elsewhere. The tenants on the Larkhill and Walton-Clubmoor Estates at Liverpool have an Association of their own; and they have also a lively little monthly periodical called the "Larkhill Review." The tenants hold meetings and conferences, which are duly reported. In the February issue, there is an account of a tenants' meeting held on Jan. 12, and of a conference with the local representatives on the City Council on Jan. 19. Several matters were discussed on both occasions; and the all-electric houses served as a very sore point. Mr. Burns represented the all-electric house tenants; and it was an unpleasant tale he had to unfold. Experience teaches. These houses without proper fireplaces and flues are not adequately ventilated; without a through current of air, they must inevitably be damp. And they are damp. The current of hot air up the chimney also provides (so to speak) a central-heating method. Mr. Burns described how the tenants are only able to keep warm by cutting-out all healthy ventilation, and by carrying their electric fires about with them. While we sympathize with the tenants, there is something humorous about the description of the reactionary methods imposed upon them by the ill-natured electricity purveyors. Ventilation and adequate warmth are necessary to health and comfort. But the coffers of the electricity undertaking apparently make a stronger appeal to the municipal governors of these estates than the misery of the tenants. Attributed to these causes, sickness is prevalent in the houses. The tenants, it is asserted, pay more and get less in comfort and more in unnecessary ill-health through the conditions in which they are condemned to live. At the conference with the local councillors, it was stated in substantiation of the charge of dampness, that the furniture in the rooms was thick with mould; even clothes hung on bedroom doors got into like condition. Underclothes when washed cannot be properly dried and aired. Water trickles down the walls of the lobbies in the houses, though the brick-built ones are not so bad in this respect. If all this is true, the Corporation surely are not proud of their participation in creating such residential monstrosities, through consideration more for their electricity concern than for the tenants of the houses. The dwellers in them, with all the described discomfort, have to pay a 2s. charge upon their assessment which the tenants of the houses that are not all-electric, and much more comfortable and healthy, do not have to pay. That is a situation which is somewhat Gilbertian. The conditions and complaints have their lessons for municipal authorities and householders; they are also the proof of a deplorable short-sightedness in housing policy.

Not Wanted.

The people of Haworth are not electrically inclined. Perhaps they are wise. The District Council wanted to indulge in trading in electricity, and so spent money on a distributing scheme. Having done this, they invited custom; and to their surprise the people did not respond with the expected alacrity and in the numbers desired. The Council are perturbed. Even an electrical exhibition has not yielded much business; and some of the inquiries are from people well away from the cables. The Council are not disposed to spend more on transmission until something arises that is more heartening in respect of the expenditure already incurred. A terrible threat has been made. If the people will not take greater advantage of the service, the Council may have to consider selling their rights to another authority. We have not heard that this has caused the people to shudder. Perhaps they would be glad if the Council got rid of their electrical obligations at once. One critic says (we cannot vouch for the accuracy of this) that the burden of the electricity undertaking is equivalent to an 8½d. rate; and he suspects it will be about 1s. when the estimates are made-up. Of course, non-users of electricity have to pay their share of any deficiency, even though they do not want the current. The Council are going to make a canvass of the dwellings and business premises on the cable routes. The people of Haworth are obviously of opinion that there is not sufficient value in electricity for them to justify expenditure upon it.

Fatalities and Earthing.

The never-ending chain of fatalities through electric shock has caused the "Electrical Review" to draw attention to the importance of adequate earthing, and its frequent inspection to see that all is well. It describes the bath-room as the danger spot in an electrically equipped household; and it urges that no portable electrical appliance should be used there. So long as plugs are put into bath-rooms, as we have seen them in so many cases, portable appliances will be used. Our contemporary points out that the same danger is also present in sculleries, wash-houses, and cellars where earthed metal is exposed, or the floor is damp. It does not agree with those who submit that three-pin plugs, as specified in the "Regulations" of the Institution of Electrical Engineers, will remove the danger; there is, and can be, no certainty that the earthing connection is intact and effective, however carefully the original installation was carried out. The "Review" has little confidence in the continuity of earth wires, unless they are short and stout, and are periodically tested—note this!—"a precaution which is rarely taken in domestic installations." A coroner recently suggested that instruction should be given in schools regarding the dangers of electricity. The "Review" is also an advocate of the same thing. Children should be warned never to touch broken wires, to climb poles, or to fly kites or throw wires over aerial lines. This is regarded as "an effective method of safeguarding not only the children, but also their parents, to whom they pass on the warning." Of course, the safest method of safeguarding would be to have no overhead wires conveying electricity; and then there would be no temptation to do those things which ought not to be done, and which have recently ended more than one young life.

Slots v. A Two-Part Tariff.

Mr. J. H. Parker, of West Hartlepool, we gather from a paper read before the Institution of Electrical Engineers' Sub-Centre on Tees-Side, is no lover of the electric prepayment meter. It is an abomination in his eyes, and is prodigal in capital expenditure. The two-part tariff, to his mind, is ideal; and it removes the need for reducing the flat-rate tariff. No one will remain on the flat rate, if it pays him better to get on to the two-part tariff; and as long as it does not pay him better, he is not meeting his fair share of the overhead charges. But about prepayment consumers and the two-part tariff. Mr. Parker has a modified form of the latter for use instead of installing slot meters, the cost of which, he reckons, represents about half the expenditure on an electric prepayment installation. Prepayment meters were in use on the West Hartlepool Housing Estates up to about two years ago, with a tariff of 7d. per unit; and, in his view, the initial cost of the prepayment meter makes the price per unit so high that it is too dear for anything except light. Two years ago, when about 100 houses were nearing completion, Mr. Parker advised the Committee to try the effect of collecting 1s. a week from each consumer with the rent—the money to be applied to the payment of the fixed charge, and rental for an electric iron and bowl fire. The units were to be registered on an ordinary meter, and charged on a monthly account at 1d. per unit. The obvious difficulty of this system was that most of the existing tenants' bills, using a prepayment meter and current at 7d. per unit, came to a smaller sum than £2 12s., which was being asked for the fixed charge and rental, and the electricity had to be paid for on top of that. Fortunately, however, there were about ten consumers whose annual bill came to more than £2 12s. and the alternative tariff was offered to them. Five changed over; but within a week several indignant letters were received from other consumers asking why they had not been offered the same terms, with the use of an iron and bowl fire. That was the beginning of the change. To-day, out of 753 occupied houses, 425 are paying on the domestic rate. Some 58 consumers pay on the ordinary flat rate at 5½d. per unit; and not all the remaining 270 prepayment consumers are remaining on that system from choice, but because some of them are so far behind with rents and rates that the Department will not take them off the prepayment system. The £2 12s. paid by each consumer on the domestic rate is allocated in the proportion of £2 5s. for fixed charges, and 7s. for rental for the bowl fire and iron. Mr. Parker, it is clear, is very satisfied with his experience.

Shoddy Wiring.

In a series of articles in "The Electrical Review," Mr. H. R. Taunton attributes to shoddy wiring the fires and accidents which have electrical origin. But while the people who carry out such work are the curse of the contracting trade, while all deplore it, and while it is doing incalculable injury to the electrical industry, he cannot find that anybody is moving to combat it. He does not, however, think it can go on much longer. Something must be done within the industry, or he foresees Government interference and hosts of new regulations and inspectors. One trouble is that users and possible users of elec-

tric light and power are, as a whole, not only indifferent to, but ignorant of, the dangers of shoddy wiring, and in any case, failing official aid, have neither the knowledge to suggest, nor the organization to enforce, the remedy. The fire insurance companies are not deeply interested in the problem. The great majority of their policies are on properties too large to be handled by shoddy wiring firms. Most of that class of work is to be found in small, cheap houses and shops which are not insured at all, or are insured for amounts which do not particularly worry the insurance offices. Electricity supply concerns do not show interest, although they would do so if they took the long-view, and remembered that every fire and fatality enormously retards the expansion of electrical service. Manufacturers and wholesalers are only concerned with immediate profits. Nothing can be expected from consultants and architects. In the end, Mr. Taunton finds himself left with the contractors themselves. It is to the "E.C.A.," to an extension of the "Register" of that organization, to a certain meed of Government co-operation, and to the intensive education of the public, that the removal of the stigma of shoddy work from the electricity industry must be looked for. The weaknesses of the "Register" are exposed by the author; and he suggests several points whereby membership of the Association can be made more effective. He puts the position in a nutshell when he writes: "At present we have the paradox of a 'Register' which ostensibly exists to maintain a standard which does not exist, inasmuch as it has no standard which it can enforce." He suggests that the Government should be asked to make some compulsory standard of domestic wiring, though we doubt whether he has any intention of adopting the numerous regulations of the Institution of Electrical Engineers. Something more simple and compact would, we fancy, be more to his mind.

NATIONAL GAS COUNCIL.

A Meeting of the Central Executive Board of the National Gas Council took place on Feb. 14 at 28, Grosvenor Gardens, S.W. 1.

In the absence of the President (Sir David Milne-Watson), the Chair was taken by Mr. FRANK H. JONES (Vice-Chairman).

LONDON COUNTY COUNCIL (GENERAL POWERS) BILL, 1928—

CONTROL AND SALE OF COKE.

The question of this Bill, which ostensibly affected the London District, was considered in 1924, when the London County Council recommended that it should be made an offence to water coke with a view *fraudulently* to increase its weight. The L.C.C. made it clear at the time that gas undertakings not only were in no way to blame, but were anxious that purchasers of coke should be treated fairly.

SULPHATE OF AMMONIA.

The attention of the Board was called to the serious position with regard to the prices received for sulphate of ammonia. Suggestions were considered as to the desirability of research being instituted with a view to cheapening the method of recovery of ammonia. The matter was referred to the Effluents Committee of the Institution of Gas Engineers for report to the Board at their next meeting.

REPORT OF THE COMMITTEE ON GAS CHARGES.

The report of the Committee on Gas Charges was received, but consideration was deferred until the next meeting.

INSTITUTION OF GAS ENGINEERS—PROPOSED ROYAL CHARTER.

A letter was submitted from the Institution of Gas Engineers, asking for the Council's support in connection with a proposal that application should be made to the Privy Council for the granting of a Royal Charter. The Board gave their approval.

PUBLIC HEALTH (SMOKE ABATEMENT) ACT, 1926.

It was decided to examine all bye-laws made under section 2 of this Act with regard t the emission of smoke.

MEETING OF THE BOARD IN APRIL.

As the usual monthly meeting on the second Tuesday in April would fall in Easter week this year, it was agreed to hold the meeting the previous week—viz., on Tuesday, April 3.

VISIT OF FRENCH GAS ENGINEERS.

It was reported that the President of the Council had received a letter from the President of the Union Syndicale de l'Industrie du Gaz en France, announcing the forthcoming visit to this country of a group of gas engineers, in order to visit the British Industries Fair at Birmingham, and at the same time to study conditions generally appertaining to the training of the young in British Universities preparatory to a career in the gas industry. It was reported that arrangements had already been made for the visit of these gas engineers to Birmingham, and that every facility would be granted them while in this country to obtain the information they desired.

FORTHCOMING ENGAGEMENTS.

Feb. 20-March 2.—BRITISH INDUSTRIES FAIR.—Birmingham and London.
Feb. 21-24.—CARBONIZATION CONFERENCE.—Midland Institute, Birmingham.
Feb. 24.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute, 7.30. Paper by Mr. H. J. Escreet, B.Sc., of the Gas Light and Coke Company: "Notes on the Laying of Gas Mains of Large Diameter."
Feb. 25.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the works of Messrs. Walter McGee & Sons, Ltd., Paisley.
March 2.—"B.C.G.A." INDUSTRIAL SALESMEN'S CIRCLE.—Meeting in Birmingham. Address by Dr. C. M. Walter, and visits to the Heat-Treatment Shops at the Windsor Street Gas-Works, and to the British Industries Fair.
March 13.—NATIONAL GAS COUNCIL.—Meeting of the Central Executive Committee.
March 13.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.
March 21.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30.
March 28.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual general meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.
April 13.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the South Western District at Ilfracombe.
April 24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Meeting at Tunbridge Wells.
May 3.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—General meeting at Tredegar (Mon.).
May 9.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Midlands District at Redditch.
May 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting at Hotel Cecil, W.C. 1, under the presidency of His Grace the Duke of Sutherland.
May 18.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the works of the Rochester, Chatham, and Gillingham Gas Company.
May 24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Cornish District at Truro.

INSTITUTION OF GAS ENGINEERS.

March 12.—Special Council Meeting for consideration of Royal Charter.
March 12.—Emergency Committee and Finance Committee.
March 12.—Effluents Research Chemists' latest report for presentation to Emergency Committee.
March 12.—Benevolent Fund Committee of Management.
March 13.—Executive Committee of Gas Education Committee.
March 13.—Wrought-Iron Tubing Research Committee.
April 2.—Special General Meeting of the Institution for submission of Terms of Royal Charter.
April 3.—Gas Education Committee.
May 1.—Refractory Materials Joint Committee.
May 8.—Executive Committee of Gas Education Committee.
June 12-15.—Annual General Meeting at Cardiff.
July 10.—Gas Education Committee.
Oct. 9.—Gas Education Committee.
Nov. 13.—Executive Committee of Gas Education Committee.
Dec. 11.—Executive Committee of Gas Education Committee.

Institution of Gas Engineers.—Candidates for membership, associate membership, and studentship (maximum age for latter, 24 years) who desire their applications to be submitted to the Council at their next meeting, are requested to forward their forms of proposal to the Secretary of the Institution, 28, Grosvenor Gardens, Westminster, not later than March 10. The Council propose to submit the terms of the application for a Royal Charter to a special meeting of the Institution on April 3, after which admission to the Institution will be by examination only.

Cracking of Paint Films.—A note of work at the United States Bureau of Standards, published in the "Journal of the Franklin Institute," states that there has been constructed by the Paint Section of the Bureau apparatus for determining when a paint, varnish, or bituminous coating on a metal panel has failed by cracking. Such failures cannot ordinarily be seen with the naked eye, unless the cracks are very bad. The operation of the apparatus is as follows: A metal panel is coated on one side with the paint. Next, a set of headphones is connected in series with the back of the panel. To the painted surface are applied a number of drops (50 in all) of a conducting solution prepared so as to wet the surface. Then a voltage from an interrupted source is placed across the headphones and panel, and the circuit completed by touching the return wire to the drops. If there is a break in the paint film, a loud buzz will be heard in the headphones. So far the results obtained by this method check with observations made on the paint.

POTENTIAL INVESTMENTS.

IX.—WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Wandsworth, Wimbledon, and Epsom District Gas Company was incorporated in the year 1912 (resulting from an amalgamation of the Wandsworth and Putney, the Mitcham and Wimbledon, and the Epsom and Ewell Gas Companies); and further powers were obtained in 1918, 1920, and 1921. The statutory area of supply extends to 40 square miles, and comprises Battersea (part of), Wandsworth, Putney, Wimbledon, Merton, Tooting, Mitcham, Morden, parts of Carshalton, Ewell, Epsom, Ashtead, and Cuddington. The services number 88,743.

The capital of the Company, as shown by the last accounts, is as follows:

CAPITAL STOCK.

	£
Wandsworth "A" stock (5 p.ct. standard)	30,000
" "B" " (3½ " ")	255,636
" "C" " (3½ " ")	108,075
Wimbledon stock (5 " ")	352,000
Epsom stock (5 " ")	98,000
New ordinary stock (3½ " ")	324,460
Preference stock 5 p.ct.	200,000
	1,368,171

	£	£
Premium capital	84,946	
Less discount on preference capital	11,867	
		73,079
Remaining to be issued—		
Capital stock	109,355	
Preference stock	261,867	
		371,222
Total amount authorized		£1,812,472

LOAN CAPITAL.

	£
3 p.ct. debenture stock	88,416
4 " " "	284,743
5 " " "	7,500
	380,659
Less discount on debenture stock	58,784
	321,875
Remaining to be issued	584,361
Total amount authorized	£906,236

Transfer arrangements: Common form. Fee for registration of transfer, probate, death in joint holdings, marriage, power of attorney, or distringas, 2s. 6d. All classes of stock can be transferred on same deed without extra fee, and in amounts and multiples of £1. Husband's witness of wife's signature, or vice versa, not accepted. Voting: 1 vote per £10 capital stock. Director's qualification £2,000 in any class of stock other than preference, or, in the case of a Director of certain absorbed companies, an amount of stock equal to his former qualification.

Accounts and dividends: Accounts made up Dec. 31, and submitted in February or March; dividends (ordinary and preference) being paid in August and after the annual general meeting. The standard price is 1s. 2d. per therm within the Wandsworth and Epsom limits, and 1s. within the Wimbledon limits. Present selling prices:

Wandsworth limits	8 d. per therm
Wimbledon "	9 d. "
Epsom "	10·2d. "

Declared calorific value, 470 B.Th.U. per c.ft.

Dividends on the ordinary stock are subject to sliding-scale (⅛d. per therm above or below the standard price) within the Wandsworth limits = ⅛ p.ct. in year's dividend on Wandsworth "A" and "B" stocks, and $\frac{7}{80}$ p.ct. on Wandsworth "C" stock, and on the "New" ordinary stock; within the Epsom limits = ⅛ p.ct. in year's dividend on Epsom stock; and within the Wimbledon limits = ⅛ p.ct. in year's dividend on Wimbledon stock. The Act of 1912 (section 55) is amended by the Act of 1921, which provides that the price of gas within the Wimbledon and Epsom limits shall not exceed by more than 1d. and 2⅛d. per therm respectively the price charged within the Wandsworth limits; and any increase or decrease is to be of the same amount throughout the whole of the limits of supply. The price within the Wimbledon and Epsom limits is never to be less than ¾d. and 1⅛d. per therm respectively above the price charged in the Wandsworth limits. In any reduction of the authorized dividends through insufficiency of profits, a pro rata reduction will be made in the dividends on each class of stock.

The following table illustrates the progress made by the Company since the year 1903. The period of the war and the few following years have been purposely ignored, in consequence of the abnormal conditions then prevailing.

The increase in the gas sold as compared with the year 1903 is no less than 328 p.ct., of which the business brought into account at the time of the amalgamation with the Mitcham and Wimbledon and the Epsom and Ewell Companies equalled 117 p.ct. The progress made by the Company from the point of view of gas sales, therefore, is exceptionally good. The capital expended, 1s. 9d. per therm (say, 8s. 3d. per 1000 c.ft.), is quite a reasonable figure; and while it is a few pence per 1000 c.ft. higher than in 1903, it must be remembered that the figure in that year was exceedingly low—in fact, at that date lower than any London or suburban Company.

Year	Average Gross Selling Price of Gas per 1000 C.Ft	Quantity Sold. Million C.Ft.	Capital Expended per 1000 C.Ft. Sold.	Gross Profit.	Total Charge for Capital.*	Rates of Dividend Paid. P.Ct. per Annum.	Amount carried Forward and Balance Reserve Fund.
	s. d.		s. d.	£	£	£ s. d.	£
1903	2 4	815	7 10	28,271	23,637	7 10 0 (a) 6 0 0 (b) 5 5 0 (c)	11,527
1908	2 0	1,038	7 0	25,551	26,863	8 0 0 (a) 6 10 0 (b) 5 12 0 (c)	14,723
1913	1 9 2 5 W 2 10½ E	2,372	7 3	60,887	66,002	8 7 6 (a) 6 17 6 (b) 5 17 3 (c) 6 2 6 (d) 6 12 6 (e)	36,055
	Per Therm. d.	Therms.	Per Therm. s. d.				
1923	8·7 9 7 W 10·9 E	14,137,459	1 9	102,568	100,747	9 1 3 (a) 7 11 3 (b) 6 6 10 (c) 7 3 9 (d) 7 13 9 (e)	33,736
1924	7 8 8 8 W 10·0 E	15,046,853	1 10	95,759	106,683	9 5 0 (a) 7 15 0 (b) 6 9 6 (c) 7 7 6 (d) 7 17 6	23,200
1925	8 25 9·25 W 10·45 E	15,465,388	1 10	102,495	104,555	8 10 0 (a) 7 0 0 (b) 5 19 0 (c) 6 12 6 (d) 7 2 6 (e)	21,650
1926	8·8 9·8 W 11·0 E	16,415,709	1 9	116,850	105,797	8 10 0 (a) 7 0 0 (b) 5 19 0 (c) 6 12 6 (d) 7 2 6 (e)	27,478

(a) Dividends on 5 p.ct. "A" stock.
(b) " " 3½ " "B" "
(c) " " 3½ " "C" and new stock.
(d) " " Wimbledon stock.
(e) " " Epsom "
W Price of gas Wimbledon limits.
E " " Epsom "

* Total charge for capital includes dividend and interest paid and amount (if any carried to reserve fund.

Having so many different classes of stock tends to retard the outside investors' interest; but at the same time there is always a ready market from gas stock investors with a knowledge of the Company. The following two tables show the prices of the highest and lowest transactions on the principal stocks—(1) the "C" and "New" stocks, and (2) the Wimbledon stock—the dividends paid, and the yield on the average prices during the four years 1923-1926 inclusive, and the transactions only for the year 1927:

"C" and New Stock.

Year.	Transactions. Highest.	Transactions. Lowest.	Dividend.	Yield P.Ct. per Annum on Average Price.
			£ s. d.	£ s. d.
1923	103	91½	6 6 10	6 10 7
1924	100	98½	6 9 6	6 10 6
1925	90		5 19 0	6 12 3
1926	91	88½	5 19 0	6 12 7
1927	97½	88½	..	..

Wimbledon Stock.

Year.	Transactions. Highest.	Transactions. Lowest.	Dividend	Yield P.Ct. per Annum on Average Price.
			£ s. d.	£ s. d.
1923	115	95	7 3 9	6 16 11
1924	118	105	7 7 6	6 12 3
1925	119½	100	6 12 6	6 0 10
1926	106	96	6 12 6	6 11 2
1927	103½	96	..	..

The average quotations of these stocks at the present time are "C" and "New" 96½ and Wimbledon 104½; and the authorized dividends under the sliding-scales for the past half-year £5 19s. p.ct. per annum and £6 12s. 6d. p.ct. per annum, yielding £6 3s. 4d. and £6 6s. 9d. respectively.

BRITISH INDUSTRIES FAIR (BIRMINGHAM SECTION).

[From Feb. 20 to March 2.]

GAS WORTHILY REPRESENTED IN THE HEAVY SECTION.

Monday of this week witnessed the opening at Castle Bromwich of the Ninth British Industries Fair (Birmingham), which is on a scale unequalled in past years, and possesses more special interest for our readers than has been the case with previous Fairs, because this is the first occasion on which there has been a comprehensive Gas Section. For the first time, too, this year their Majesties the King and Queen are visiting the Birmingham Fair. Much could be said of the magnitude of the task of bringing into being this Heavy Section, where more than 3000 workmen have been engaged in preparing a ten-and-a-half acre display of the finest products of Britain's workshops; for every department shows development even over last year. We must, however, confine attention to the Gas Section, and other exhibits which make particular appeal to our industry. The display in the Gas Section is one worthy of a great industry, which is the highest meed of praise that can be given to the organizers. Some idea of the extensive preparatory work which the Fair has entailed for the Birmingham Corporation Gas Department will have been gathered from the article which appeared on p. 322 of last week's "JOURNAL."

OPENING DAY.

There was a spirit of cheerful optimism abroad on Monday morning when the huge range of buildings at Castle Bromwich was thrown open to visitors to the Birmingham Section of the British Industries Fair. This optimism was justified by the remarkably fine display which has been got together, and which was practically complete in every detail when the time for opening arrived. The organization of these annual Fairs has attained an extraordinary degree of efficiency; while the exhibitors in this Heavy Section have brought forward their best productions, and are displaying them under the most attractive conditions, and at considerable expense.

EIGHT MILES SHOP WINDOW OF BRITISH EFFORT.

The opening was marked by an official luncheon, at which Mr. G. N. Guest took the chair, as President of the Birmingham Chamber of Commerce. Replying to the toast of "the Lord Mayor and City," Alderman A. H. James, C.B.E. (Lord Mayor of Birmingham), paid eloquent tribute to the work of those responsible for so vast an organization. He recalled that the foundations of the success of the Fair were laid many years ago, and declared that the Birmingham Section has now passed its embryo stage, and has established itself as a permanent institution of the country. Last year, he said, the Fair was a huge success, and this year promises to be an even greater success. Sir Edward M. Iliffe, C.B.E., M.P., in proposing the toast of "The British Industries Fair, Birmingham," expressed the view that there is much at the present time to justify a sanguine outlook, and that the Fair is a triumph for the Birmingham Chamber of Commerce, who are entirely responsible for it. The toast was responded to by Mr. R. C. Rodgers, Vice-Chairman of the Fair Management Committee.

THE EXHIBITS.

During the luncheon it was stated that last year's exhibitors exceeded those of the previous year by 50 p.ct., and that this year there is another 50 p.ct. increase, inasmuch as the number has gone up from 600 in 1927 to 900 on the present occasion. To cover the Fair in a single day would be an impossible task, if the visitor wished to inspect the wares of all these 900 firms; but it will take far less than a day for any self-deprecating Britisher to get infused into him a feeling of pride as he walks down avenue after avenue, and sees the perfect workmanship of which his fellow countrymen are capable, and the exquisite beauty of their products. Overseas buyers are coming from all quarters of the globe; and they will be warmly welcomed. But let the Britisher come too—not only to buy, but to get the confidence in his country's great capacity which he too often seems to lack.

As has been mentioned already, there has this year been inaugurated a complete Gas Section; and of its contents full notice will be found on following pages. But, in addition to this, there are scattered all through the Fair exhibits—some of which we shall hope to see included in the Gas Section—of direct or indirect interest to "JOURNAL" readers. The number is too great for individual reference in our pages; but some of them, so far as time has permitted, are indicated in this issue (after the description of the Gas Section), and a few more will be dealt with next week.

A COMPREHENSIVE CATALOGUE.

The official catalogue is on a scale commensurate with the importance of the Fair. For the benefit of foreign buyers, there is an alphabetical list of articles exhibited printed in French and Spanish, as well as English, together with the building and the numbers of the stands.

THE GAS SECTION.

Most of those who read the "JOURNAL" can remember when history was taught in our schools as a series of disconnected events, and when the so-called study of history consisted chiefly of memorizing strings of dates. Fortunately our methods of teaching have changed; and bearing in mind the progress that has been made in this direction, it behoves us to do something more than chronicle the appearance of the Gas Section in the British Industries Fair as "Date 1928," and to look back for the causes which led up to it.

The British Industries Fair owed its genesis to the cutting-off of foreign markets during the war, when British manufacturers felt the need for getting together to see how best they might among themselves supply the various articles for which a demand had sprung up. Such goods had previously been supplied from foreign sources. A small exhibition of samples was planned through the efforts of the various Chambers of Commerce, and took place in London so long ago as 1917. It was from this small exhibition that the true British Industries Fair really sprung. Once the movement started, it grew in magnitude; and its later history is well known. To-day we have two distinct sections—the London Section at the White City, and the Birmingham Section at Castle Bromwich.

GENESIS OF THE GAS SECTION.

The Birmingham Section is run under the auspices of the Board of Trade, and organized by the Fair Management Committee and controlled by the Birmingham Chamber of Commerce. Mr. A. W. Smith, the General Manager and Secretary of the Birmingham Corporation Gas Department, has been a member of the Fair Management Committee since its formation. From the intimate knowledge of the Fair itself that he was thus able to gain, he was able to realize to the full the manner in which its importance was increasing year by year. It was to him, as to many others in the industry, a matter of regret that the gas industry was taking so small a part in this national exhibition. Isolated stands by firms in the gas industry there certainly were; but these only served to emphasize how meagre was the industry's representation as a whole. The schedule for the Birmingham portion of the Fair includes the sections open to manufacturers of plant and appliances for power, heating, cooking, and lighting; and it was essential that the gas industry should be represented in these sections.

From time to time, as opportunity offered, the need for proper representation of the gas industry at the Fair was brought to the notice of the various organizations by Mr. A. W. Smith. In the early part of 1927, the Society of British Gas Industries had under consideration the question of its members taking part in the various gas exhibitions throughout the country; and it was decided that the Council of the Society should visit the British Industries Fair last year, in order to obtain first-hand knowledge of its size, ramifications, and importance. Mr. F. J. Gould (as Chairman of the Society) at that time urged upon his colleagues the importance of manufacturers in the gas industry being adequately represented at the Fair in future years.

A meeting of manufacturers in the gas industry was convened in Birmingham on July 21, 1927; and the Chairman at that meeting (Mr. A. W. Smith) explained that there was a feeling that some kind of co-ordinated display would be to the benefit of all concerned, but it was in his opinion a matter for the manufacturers themselves to decide. He understood that the question had been before other meetings of the Society of British Gas Industries; that the Secretary of that Society had addressed a letter to all members; and that the meeting was the upshot of these previous negotiations.

It was resolved at this meeting that a Sub-Committee should be formed, consisting of representatives of various manufacturers in the gas industry and representatives of the British Industries Fair Committee. The Sub-Committee comprised the Chairman of the Society of British Gas Industries (Mr. R. B. Hodgson), representatives of the firms of Messrs. George Bray & Co., Radiation Limited, and the Parkinson Stove Company, together with Dr. C. M. Walter (of the Birmingham Gas Department) on behalf of the manufacturers of industrial furnaces, and Mr. R. J. Rogers (of the Birmingham Gas Department). The following members of the Fair Management Committee were also co-opted on to this Sub-Committee: Mr. G. N. Guest (President) and Mr. G. H. Wright (Secretary)

of the Birmingham Chamber of Commerce, Col. H. J. Walduck (Chairman) and Mr. R. C. Rodgers (Vice-Chairman) of the Fair Management Committee, and Mr. Charles Stanley (General Manager) and Mr. C. Elliott (Technical Assistant) of the British Industries Fair, Birmingham.

Mr. R. J. Rogers was asked to take over the duties of Hon. Secretary; and the thanks of the industry are due to the Birmingham Gas Committee and to Mr. A. W. Smith for allowing him to take on this work, and for the assistance they have given the Sub-Committee in granting accommodation and the use of their staff to deal with the very great amount of correspondence which was necessary in the preliminary negotiations and the organization of the section up to this date.

The Section Comes into Being.

Since its formation, the Sub-Committee has met regularly; and under its guidance and the auspices of the great national organizations—the Society of British Gas Industries, the National Gas Council, the Institution of Gas Engineers, and the British Commercial Gas Association—the Gas Section has come into being. As visitors will notice, the Sub-Committee agreed upon a general style of stand, and also a distinctive colour scheme. Almost without exception, the exhibitors co-operated in the adoption of the colour scheme, and were able to adapt the suggested stand design to their own particular needs in such a way that one finds a similarity of design throughout the section, sufficient to establish its identity as separate from the rest of the Fair, without slavish uniformity in every particular.

The buyer visiting the Fair cannot fail to be struck with the transition from a long avenue of stands of the usual character, with black and white lettering and front facia board, to a section where a distinct type of stand and a warm and cheerful colour scheme mark a break which must be apparent to him, even if he is not interested in the gas industry; while the buyer in our own industry must feel that he has reached a section which is devoted entirely to his needs and interests. When one considers that the Birmingham Branch of the British Industries Fair will be visited by the Lord Mayors, Lord Provosts, and Mayors of most of the principal cities and towns in the United Kingdom, by members of Parliament, by representatives from all the British Chambers of Commerce, and by the chief industrial Associations throughout the country, it becomes clear that the existence of this special Gas Section will result in the industry obtaining advertisement and recognition among those who, from their position, will naturally do much to influence public opinion.

So long as the Heating, Lighting, and Cooking Groups are included in the Fair schedule, and so long as the various competitive agencies in these operations set themselves wholeheartedly to take advantage of the Fair, the gas industry cannot afford to be unrepresented. All types of coal grates and fireplaces, all the various methods of oil heating, both for domestic and industrial purposes, are displayed, not by one or two firms only, but by exhibits really representative of these particular branches of industry. There is no need in these columns to enlarge upon the very active part our electrical friends are taking in the Fair. It is sufficient to say that the electrical industry is staging exhibits which, from their number, size, and diversity, cannot fail to impress upon visiting buyers the importance of that industry. If the gas industry had been content to stand aloof from these sections, the result must have been to create an adverse impression in the minds of visiting manufacturers and buyers, which would have necessitated the expenditure of thousands of pounds in newspaper advertisement to remove.

An Excellent Position.

In these circumstances, therefore, there can be no doubt that the gas industry as a whole owes a debt of gratitude to the Gas Sub-Committee for its efforts in organizing the section. The gas industry must count itself singularly fortunate, also, in having secured so excellent a position—stretching as it does across the very centre of the Fair building. Some 16,000 sq. ft. of stand space were allotted to the Gas Section; and this is fully booked-up. The section is a long way yet from equalling its competitors in size alone; but we can congratulate ourselves that the best possible use has been made of the opportunities afforded.

Personal.

As mentioned above, the Birmingham Gas Committee kindly allowed Mr. R. J. Rogers to take on the Hon. Secretaryship; and the successful organization of the section is very largely due to his energy. Although it is purely an accident that the Fair should be held in the area of the Birmingham Gas Department, yet this fact is a fortunate one for the industry. We have already published some figures dealing with the complicated system of supply which the position of the Fair and the sudden temporary demand for gas necessitate. These arrangements have been under the guidance of Mr. R. G. Marsh (Fittings Engineer) and Mr. R. J. Rogers' Technical Assistant (Mr. W. E. Cadwallader), who also are to be congratulated on the excellent way in which they have carried out their work. Mr. Rogers is fortunate, too, in having the assistance of Mr. W. L. S. Spinks (who is known to some of our readers as the late Chairman of the Midlands Salesmen's Circle); but one feels that not only Mr. Rogers, but the whole of his staff must have had many very busy weeks prior to the opening of the Fair. There can be no doubt that, had not the organization of the section been in capable hands, it would not have obtained that measure of success which is now apparent.

Come to the Fair.

Invitations have been forwarded to gas engineers and their staffs throughout the country; and further tickets and reduced railway fare vouchers may be obtained on application to either the Hon. Secretary of the Section, at the Gas Offices, Council House, Birmingham, or to the General Manager, British Industries Fair, Chamber of Commerce, 95, New Street, Birmingham, provided the names of the persons for whom the tickets are required are forwarded with the applications.

The attention of all Continental Gas Associations has been drawn to the Fair and to the Gas Industries Section; and already intimation has been received from gas engineers in different countries of their intention to visit the Fair. Yesterday, for example, sixteen French gas engineers, representative of the industry of that country, went to Birmingham and inspected the section.

The Exhibitors.

And now a word for the exhibitors. Due recognition must be given to all those who have taken space. While it may be hoped that each and every one of them will obtain immediate results which will amply repay them for their individual outlay, yet it must be remembered that they took all the risk of embarking upon what, when the question of exhibiting was first mooted, probably seemed to some of them a hazardous proposition. By their action, they have given to the whole industry a free advertisement of the greatest value, the far-reaching results of which it is difficult to estimate. It is indeed gratifying to learn that this action on the part of the manufacturers has been appreciated by gas engineers and administrative chiefs, who in large numbers have signified their intention of visiting the Gas Industries Section. We can assure such visitors that they will find in the section much to interest them. Before the close of the Fair, all parties concerned should have ample cause for congratulation.

Birmingham's Important Position in the Industry.

On the Birmingham Corporation stand, it is stated that:

13,372,889,300 c.ft. of gas were sold in Birmingham during 1927.

2,799,192,100 c.ft. were used in industrial apparatus by 3000 manufacturers.

Some Pertinent Facts.

These facts are written large right across the building in which the Gas Section is housed:

Over 100,000 men are employed in the gas industry.
£160,000,000 capital is invested in the gas industry.
The gas industry's wage roll is over £15,000,000.
The use of gas has doubled since 1900.
Gas is the fuel for homes of to-day.
Ninety per cent. of the population cook by gas.
Gas is used in nearly nine million homes and factories in Great Britain.
Gas is used in over 3000 industrial processes.
Gas has a record of over 110 years' public service.
Ten million gas fires are giving clean, smokeless heat.
Gas will solve the nation's smoke problem.
If it's heat you want, it's gas you want.
Gas improves conditions for industrial workers.
Gas is the best fuel for producing high-quality goods.

NOVEL HEATING DEVICE.

Gas Mantelpiece for High and Low Temperature Radiation.

The dining room in "AA" Building and the two snack bars are warmed by a new type of gas heater designed by Mr. R. J. Rogers, Chief Superintendent of the Fittings Department of the Birmingham Gas Department. This novel form of heater (which has been provisionally patented) has recently been used with great success at the Grocers' Exhibition in Birmingham, and is also employed at the Brighter Homes Exhibition now being held in that city.

The object of the device is to utilize the heat of the products of combustion from a radiant gas fire or the like as an additional warming agent for the room or corridor in which the fire is situated, instead of passing them directly into the chimney. Broadly, therefore, the invention consists in mounting the gas fire in front of, or in association with, a hollow casing into which the hot products of combustion from the fire pass directly. These gases may then either pass from the casing into a chimney or ventilation shaft, or, where the fire is used in a large room with adequate means of ventilation, they may pass from the casing into the upper part of the room itself. In the particular design of heater used at the British Industries Fair, the gas fire is recessed so that there is no projection beyond the

side wings of the mantel; and in front of the recess a guard of expanded metal is fitted, to prevent the possibility of accidents occurring through the contact of clothing with the radiants of the gas fire.

When the fire is lighted, the products of combustion (which in the normal way go directly into a flue, and are carried away from the room) pass into the mantel-box, and very quickly raise the temperature of the whole of the sheet metal. Low-temperature radiant heating is thus obtained from the whole area of the mantelpiece, in addition to the high-temperature radiation from the gas fire itself. The interior of the mantel has been designed with baffles which guide the products of combustion in several directions through the heater; and arrangements are made for the collection of condensation which takes place when the fire is first lighted. This condensation is caught in non-corrodible troughs, which are situated in such a position that any condensation formed on first lighting is afterwards evaporated by the heat, and the troughs left empty.

In addition to the gas fire fitted in front of the mantel, two flat-flame burners are provided at the base of the side panels, so that these may be used in place of the fire when smaller consumptions of gas only are required, to provide low-temperature radiation. The heaters to be seen at the Fair have been dressed with a special heat-resisting paint, and grained to resemble oak; but various forms of front panels may be used—such as marble, wood, or other material—in order to give the appearance of an ordinary mantelpiece.

With the new heater, it is claimed that over 50 p.ct. of the heat of the products of combustion is utilized in the room as low-temperature radiation, and that the approximate amount of heat obtained is:

50 p.ct. high-temperature radiation.
30 p.ct. low-temperature radiation.

While 20 p.ct. of the heat is carried into the flue proper or into the room, or corridor, where, as previously mentioned, it may be released, provided there is ample air movement.

From an examination of the new mantel heater in actual use, it would appear that it will command the attention of those who are interested in the greater utilization of the available heat from gas, as there is no doubt as to its effectiveness in providing additional warmth from a larger radiating surface than has hitherto been customary in gas-fire heating.

THE HOME OFFICE INDUSTRIAL MUSEUM.

Visited by the Illuminating Engineering Society.

On Feb. 17, members of the Illuminating Engineering Society visited the Home Office Industrial Museum in Horseferry Road. The museum is intended to be a permanent exhibition of the best methods, arrangements, and appliances for ensuring the safety, health, and welfare of the human element in industry. Its establishment was decided upon before the war; but the building, though erected then, has only been equipped during the past two years. The museum, which is the only one of its kind in this country, is open to the general public in the mornings, and is available in the afternoons for visits by those who are concerned with problems of safety, health, and welfare in industry. The floor space available for exhibition in the gallery and on the ground floor is 10,000 sq. ft.; while in the basement a lecture hall is provided, together with rooms devoted to ventilation and lighting.

Prior to a tour of inspection of the many interesting exhibits, Mr. H. C. Weston, Investigator to the Industrial Fatigue Research Board and the Illumination Research Committee, described the exhibits bearing on illumination. He explained that, in addition to the exhibits contained in the room devoted to the demonstration of the principles and methods of illumination, the lighting installation throughout the whole museum is itself an interesting exhibit. The installation has been planned to provide an initial illumination of 15 foot-candles, except in the lecture hall, where the illumination is 7·5 foot-candles.

The lighting room is provided with a number of cabinets containing exhibits which are self-explanatory. The main objects of the exhibition are to illustrate the first principles of lighting, to show the relation between the nature of the work and the amount and kind of illumination required, and to draw attention to certain conditions found in factories which affect the efficiency of the lighting installation. One exhibit, illustrating the law of inverse squares, consists of a movable lamp illuminating a screen; the distance of the lamp from the screen and the illumination of the latter being shown on scales graduated in foot-candles and inches. The law of reflection of light, and its importance in connection with the position of light sources with respect to the work, are demonstrated by another exhibit; while the effect of the reflection factor of the work on the amount of illumination required is also shown. Other exhibits show the value of shadow as an aid to the discrimination of detail, and the disadvantage of shadows produced by unsuitable arrangement of light sources. Important exhibits are those which demonstrate the effect of illumination on the rate of perception, and the effect of direct glare from bright unscreened light sources near the line of vision. Not only are accidents caused by failure to provide sufficient illumination to permit the quick perception of obstacles or moving parts of machinery, and by the temporary impairment of vision brought about by glare, but serious loss of output also results from these conditions.

Two exhibits illustrate the importance of keeping lamps and fittings clean if loss of efficiency is to be avoided; and in a model room, forming part of one exhibit, the effect of dirty windows in reducing daylight illumination can be seen. The effect of the colour of the walls of a room upon the illumination secured from a given installation is shown in another exhibit; while the influence of the spectral composition of the light used on the discrimination of slight differences of colour is also demonstrated. Two exhibits are devoted to showing the minimum illumination values recommended by the Home Office Departmental Committee on Lighting in Factories and Workshops for certain classes of work, samples of which are shown; and there are two exhibits showing a variety of adjustable fittings for local lighting. Portable photometers are shown; and a further exhibit consists of a collection of industrial fittings, with notes on their special features and uses.

The lighting exhibition, Mr. Weston explained, is not final. There is, he said, room for additional exhibits.

Among the exhibits of welfare work is a gas-fired fish-frying range by the Falkirk Iron Company. Nearby is a table on which is a selection of Home Office literature, including a booklet on the equipment of canteens. Glancing through this, we noticed that electricity is referred to as being the cleanest and most efficient cooking agent; the time-worn meat-shrinkage argument being used. However, it is stated also that gas is satisfactory, as it is cheaper to use and easier to understand and regulate.

In the laundry section, a "Metro" gas iron is on view as indicating what care has been exercised in its design to render it absolutely safe to use. A descriptive card explains the safety-devices—such as a porcelain insulator, to prevent the heat of the iron from reaching the rubber connection of the flexible tube—incorporated in the iron.

"Distar" and the Anopheles Mosquito.

Our gas friends who carry on their operations in the tropics have a lot of "odd things" to do to promote the interests of their undertakings. We have just received from Mr. J. W. Brown, Manager of the Barbados Gas Company, an advertisement for what is called "Distar." The circular is addressed to planters, employers of labour, and the general public; and it states that the medical, sanitary, and religious bodies report "dangers from anopheles mosquito." Further, newspaper reports state that labourers are "dying off like flies." "Distar" is the corrective of these conditions. It is stated that it is the cheapest and most effective material sold in Barbados to destroy the danger, and to remove its terrible results. Planters are advised, if they desire healthy labourers to help with their 1928 crop, to distribute "Distar" freely on their lands, and give to the labourers supplies to use around their homes. It is declared that "one gallon of 'Distar' is more effective than ten gallons of fuel oil." The virtues of the substance appear to be complete. Spraying it in ditches, ponds, drains, around and over farmyard heaps—in fact, wherever there is any form of insect life—means death to it, and will wipe malaria off the island. It contains no arsenical poisons to cause danger to cattle, growing crops, or foodstuffs. After careful research, in the gas-works' chemical laboratory, there has also been success in producing a fluid disinfectant, which is called "Bargas Fluid;" and it is declared that, although it might be mistaken for the well-known "Jeyes," it contains properties of its own, which make it very powerful. These products are an indication of the side lines in which a tropical gas-works has to engage.

SCIENTIFIC AND INDUSTRIAL RESEARCH.

Report of the Committee of the Privy Council for 1926-27.

The report of the Committee of the Privy Council for Scientific and Industrial Research covering the period from Aug. 1, 1926, to July 31, 1927, which is the twelfth of the series, has been published at the price of 3s. net (postage extra) by H.M. Stationery Office, Adastral House, Kingsway, London, W.C. 2. It indicates the varied nature of investigations already undertaken; and a continuance of this active policy may be anticipated, in view of the fact that during the period referred to the Committee received recommendations from the Advisory Council on the programme of research for 1927-28 for which, and for administrative services, they have drawn net estimates amounting to £451,951, as compared with £442,877 for 1926-27, and £380,263 for 1925-26.

PERSONAL.

Mention is made of the fact that in May last Sir Richard T. Glazebrook, K.C.B., F.R.S., was appointed a member of the Advisory Council. Under the new rules for the determination of the periods of appointments to the Research Boards and Standing Committees of the Department (which took effect on March 31), Mr. R. A. Burrows and Sir John Cadman, K.C.M.G., D.Sc., retired from the Fuel Research Board; and their places were filled by the appointment of Dr. G. C. Clayton, C.B.E., M.P. (a member of the Advisory Council), and Mr. H. Eustace Mitton. The part-time services have been secured of Dr. Calvert, M.B.E., F.I.C. (Chemical Inspector in the Ministry of Health), to initiate a new branch of work as the first Director of Water Pollution Research. Sir Richard Threlfall, G.B.E., F.R.S., has completed his period of part-time service as Director of Chemical Research; but he will continue to assist the Department in the supervision of the laboratory and by advising on certain questions.

CHEMICAL REACTIONS AT HIGH PRESSURES.

The twelfth annual report of the Advisory Council, which is submitted along with the report of the Committee, states that the Council have recently recommended a grant of approximately £1500 a year for three years to enable the Imperial College to appoint research assistants to Prof. Bone for work on chemical reactions at high pressures. Imperial Chemical Industries, Ltd., are supplying the College with the expensive equipment necessary. The use of very high pressures in chemical manufacture is rapidly extending; and it is important, in the opinion of the Council, to encourage at least one University centre to organize scientific research in directions which promise such great industrial advances. Work of this type is not without danger, and requires the supervision of a highly skilled staff.

LOW-TEMPERATURE CARBONIZATION.

Gratification is expressed at the fact that the Gas Light and Coke Company, after an exhaustive survey of existing low-temperature carbonization plants, selected the experimental retorts developed at the Fuel Research Station as being the most promising type for a commercial trial of the process for use in conjunction with London gas-works; and also at the decision of the Government to guarantee a loan to a Subsidiary Company of the Gas Light and Coke Company to enable them to put down a plant capable of producing about 100 tons daily of smokeless fuel. On this subject, the Council say: "The plant, when erected, will be worked by the Company at their expense under commercial conditions for three years; and all the results will be made freely available to British firms. We consider that this plant should effectively indicate the value and possibilities of low-temperature carbonization to the gas industry. Many exaggerated claims have been made on behalf of low-temperature carbonization; and the natural result of unfulfilled prophecies is that in many quarters undue pessimism prevails. We consider that neither extreme optimism nor pessimism is justified, since we have yet to learn the facts on which a sound judgment of the commercial success on a large scale of any low-temperature carbonization process can be based. The approved scheme will, we hope, provide the essential facts."

CONVERSION OF COAL INTO LIQUID FUEL.

The next matter to which reference is made is the arrangement entered into eighteen months ago by the Department with Dr. Bergius and the British Bergius Syndicate, as the result of which a number of experiments have been carried out in Germany on the treatment of selected British coals with hydrogen under high pressure at moderately high temperatures. These experiments have shown beyond doubt that by such treatment a large proportion of the coal substance can be converted into liquid fuels. The information in the possession of the Department does not, however, make it possible to assess the commercial value of these developments. Whether, it is added, this new industry can be established on a large commercial scale before the natural sources are insufficient to supply the increasing demand for liquid fuels, remains to be seen.

COKE RESEARCH COMMITTEES.

Arrangements have been entered into with the Tar Distillers' Association for co-operative work in connection with the properties of pitch required for the manufacture of briquettes and other purposes; and with the National Federation of Iron and Steel Manufacturers for a substantial development of the investigations on the production of metallurgical coke. The Federation have been instrumental in forming local Coke Research Committees, at Sheffield, Newcastle, and Glasgow; and a grant is recommended to be made towards the expenses. At the Fuel Research Station the investigation is being continued on the reactivity of cokes. There has been worked-out a laboratory method of giving a numerical value for reactivity which, though at present purely empirical, furnishes consistent results, and enables comparisons to be made.

ATMOSPHERIC POLLUTION.

There is to be transferred to the Department the conduct of investigations into atmospheric pollution previously carried out by the Air Ministry Advisory Committee on Atmospheric Pollution; and under the new organization the work will in future be supervised by a Committee of the Fuel Research Board, known as the Atmospheric Pollution Research Committee. Dr. J. S. Owens, who, as Secretary to the Advisory Committee, has been responsible for the co-ordination of the results published, will, as Superintendent of Observations, continue this work, and will also assist in the conduct of the researches undertaken.

FUEL RESEARCH BOARD.

In the summary of work carried out, mention is made of the report of the Fuel Research Board for 1926, which was published last summer, and fully reviewed in the "JOURNAL" for July 20. In spite of the interference with operations occasioned by the coal stoppage, considerable progress was made with much of the work—including the physical and chemical survey of the national coal resources. Several reports have been published in connection with this matter, and their appearance notified in our pages. Others are in hand. A large-scale test of a Scottish coal (Kinneil coal) has been carried out at the Fuel Research Station. The coal proved a satisfactory gas-making one, and particularly suited for low-temperature carbonization in vertical retorts of the type developed at the Station. A similar test has been carried out on a Somerset coal (Parkfield). A motor van has been fitted with a special machine to enable samples of commercial grades of coals, as obtained from the different collieries, to be taken with a minimum expenditure of time and labour. Good progress has been made in collecting and summarizing the available data dealing with the correlation, &c., of the various coal seams in the different areas.

INORGANIC CONSTITUENTS.

With regard to high-temperature carbonization, a comprehensive programme of work has been undertaken to determine the effect of size of coal charged, temperature of carbonization, and other variables, on the yields obtained. Much is expected of the coal washing and cleaning plant at the Fuel Research Station. It is pointed out that recent work at the Station, as well as that of Cobb, Lessing, and others, has shown that the inorganic constituents in a coal or coke may have marked effects on its behaviour, and that these constituents are not necessarily merely harmful diluents in the coal. These observations, which indicate the need for much further investigation, are being followed up. Interesting results have been obtained from the continuously-working Bergius hydrogenation plant, of a capacity of about 1 ton of coal per day, which has been erected at the Station. Other methods of obtaining oil from coal are also under investigation.

CHEMICAL RESEARCH.

In the Chemical Research Laboratory attention has been given to the major constituents of low-temperature tar. The thermal decomposition which occurs during repeated distillations of the various fractions has been greatly diminished by the employment of solvents, and by distillation under considerably reduced pressure. These modifications, which are still in the experimental stage, have lessened the production of pitch, and have increased the yield of waxes and aromatic hydrocarbons. Moreover, since less decomposition occurs, the solvent methods of separation provide a far more reliable indication of the primary constituents of the tar. Work has also been taking place on complex constituents of coal tar.

ILLUMINATION.

The work of the Illumination Research Committee has been continued; and some extremely useful results have been obtained and published. Considerable progress has been made in the research into the relation between glare and visibility in street lighting. A model street has been designed for the carrying out of practical experiments, and investigations are being made to determine the effect of a glaring source of light on the ability of the eye to perceive differences of brightness. An inquiry into the effect on clerical work of the distribution and colour of various systems of lighting has been completed.

THE GAS SECTION.

AN ILLUSTRATED ACCOUNT OF A NOTABLE DISPLAY.

[The stands are dealt with in alphabetical order of the firms exhibiting.]

J. C. ABBOTT & CO., LTD.,

Lloyd's Bank Chambers, New Street, Birmingham.

(Stand No. 5; Block F. 13.)

Attention is drawn here to analyses of, and bye-products yielded by, best Yorkshire gas coal. Also to various cokes—"Celtic" special foundry coke, used for high-grade engineering castings; special compressed Durham foundry coke, for all classes of general castings; and patent coke, for melting metal. Other exhibits are foundry pig iron and special cylinder iron, for motor castings and general engineering castings.

The firm are merchants of pig iron, coal, and coke of every description, and are sales agents in Birmingham for a number of well-known undertakings.

JAMES BARKER,

Jackson Street and Whitehead Street, Oldham.

(Agent for Messrs. S. T TAYLOR & SONS, LTD., Tynos Works, Scotswood, Newcastle-on-Tyne.)

(Block No. G. 13.)

Mr. James Barker, who is an expert in the lagging of flues, &c., at gas-works, has exclusively handled for several years "Tynos" insulations for all gas-works requirements. Messrs. Taylor & Sons are the sole makers of the "Tynos" non-conducting insulations—in sectional and composition forms—to suit any temperatures; and they may be congratulated upon the success which has attended their latest non-conducting covering production for preventing the infiltration of heat in connection with marine, Lancashire, and water-tube boilers and pipes and retort brick settings. Their specialities are equally applicable to waste-gas flues where waste-heat boilers are installed. They find, indeed, a valuable application in this connection.

The firm have had their "Tynos" high-temperature covering under test; and on firing tests the covering withstood temperatures ranging from 920° to 1180° C. In a number of important gas-works in the country "Tynos" laggings are being applied to waste-heat gas flues carrying 1000° Fahr., and also to retort brickwork settings. "Tynos" high-temperature covering is being regularly applied to the heated surfaces—700° to 800° Fahr.—of marine Diesel engine installations, with highly satisfactory results.

A. BELL & CO., LTD.,

Kingswell Works, Northampton.

(Block No. G. 12.)

This exhibit consists of Bell patent faience gas fires shown in two sizes—five and seven radiant. These fires are supplied in any of the very beautiful Delft colours, and are guaranteed to be perfectly efficient and satisfactory in every way. They have no visible metal work; and a novel feature is the Bell patent hook-on fuel, which hangs on the backbrick.

CITY OF BIRMINGHAM GAS DEPARTMENT.

(Stand No. 1; Block D. 12.)

The City of Birmingham Gas Department have arranged a stand devoted mainly to the activities of their Industrial Section. The display covers an extremely wide range of standard and special furnaces and general industrial gas appliances which may be used in an extensive number of industries. The general lay-out of the stand has been arranged to conform to the requirements of the special designs which are a feature of the Gas Industries Section this year. In the middle of the stand an office has been provided, which is used as an inquiry bureau, where information on all types and forms of industrial appliances is available. Drawings, blue prints, and photographs of many special furnaces and installations are there for inspection by interested inquirers. Furnaces, and the general industrial apparatus which is described later, are suitably arranged around. Unfortunately, it has not been found possible this year to show and demonstrate these furnaces under working conditions.

A large number of firms are now making gas furnaces and industrial apparatus; and the exhibits on the stand of the Birmingham Gas Department have been selected from the most modern designs of these various makers. Many of the furnaces are small models of the larger sizes which are demanded by many industries. The exhibits, taken individually, are representative of the productions of the following firms; and the description gives brief details of size and the applications for which each furnace is suitable.

Gibbons Bros., Ltd., Dudley.—A new type of counter-current recuperator gas-heated oven furnace is shown. It embodies, in a standard size having a working chamber 3 ft. deep by 2 ft. wide by 1 ft. high, the features which are now well known in the oven and muffle furnaces developed by this firm, together with the most recent improvements which have revealed themselves as these furnaces have been installed and run over a period of two or three years. Special attention has been paid in this design to refractories and insulation.

Incandescent Heat Company, Ltd., Smethwick.—The Birmingham Gas Department are showing a standard model of the "New Type" oven furnace designed and manufactured by this firm to meet the need of the manufacturer requiring a reasonably substantial furnace for annealing, hardening, and general heat-treatment operations at a comparatively low price. The special moulded lining showing the complete construction of the firebrick interior is also exhibited. The size of this furnace is 18 in. deep, 12 in. wide, by 9 in. high; and it is priced at the low figure of £21.

Cox's Ignite Combustors (Metropolitan Fuel Company, Ltd., London).—A tank suitable for water or solution heating is shown as representative of the highly efficient system of heating developed by this firm, whose products are now being widely adopted. The tank is a standard size, and is fitted with an internal "Combustor." It is complete with thermostat.

Lucas Furnaces, Ltd., Birmingham.—The patent "Anti-scale" oven furnace made in all sizes by this firm, for the general heat-treatment operations carried out in the engineering trades with a minimum of oxidation, is represented by a furnace 18 in. deep by 12 in. wide by 9 in. high. The special features of combustion products outlet at the front of the furnace and metal recuperator tubes are embodied.

Brayshaw Furnaces & Tools, Ltd., Manchester.—The range of high-speed steel-hardening furnaces made by Messrs. Brayshaw are met with in many works up and down the country; and the No. 2 size shown by the Birmingham Gas Department is of the design with which high temperatures are obtained by means of a gas and air blast burner in a very short time from lighting-up. The special details of burner, door, and tool-handling arrangements are embodied. The furnace has twin chambers, each measuring 9 in. wide by 8 in. high by 8 in. deep, with door openings 7 in. wide by 6 in. high.

British Furnaces, Ltd., Chesterfield.—This firm have recently developed a soft-metal melting furnace to meet the needs of the manufacturer demanding the use of low-pressure gas without air blast; and the furnace shown is a standard size of this type, fitted with special low-pressure burners. The furnace has a melting capacity of 3 cwt. of lead.

Selas Gas & Engineering Company, Ltd., Manchester.—The Gas Department are showing a standard rotary fitting furnace of the type which has been developed by the Selas Company, and with which this firm have obtained some remarkably low figures of gas consumption for the melting of aluminium. Crucibles are eliminated by the use of this type of furnace; and figures as low as 6000 c.ft. per ton of aluminium melted have been obtained over a long-period test on an installation in a local works.

John F. Askam, Birmingham.—A compact form of muffle furnace fitted with low-pressure gas burners for enamelling and other special operations represents this maker on the Gas Department's stand; and the furnace takes a muffle chamber measuring internally 8 in. wide by 14 in. deep by 5¼ in. high.

A. H. Wilkes & Co., Birmingham.—This firm have on the stand three of their standard types of soldering iron heating stoves fitted with low and high pressure gas burners, together with a series of special injectors with adjustable gas jet and air regulators. The sole agents for these injectors are Messrs. F. J. Ballard & Co., Ltd., Tipton.

J. Rowell & Sons, Newcastle-on-Tyne.—The makers of the "Thermecon" range of disc flame burners, in sizes ranging from a small boiling ring to a large burner with a 3 in. injector, are represented by a selection of these standard burners.

There is a rotary carburizing furnace, fitted with a heat-resisting container; this being designed primarily for the automatic carburizing of small parts. The furnace is so arranged that the material does not require packing in boxes, but is inserted into the rotating container in contact with the carburizing medium. This apparatus was recently placed on the market by Messrs. Gregson Partners, Ltd.

In addition to the above exhibits, representing the designs of the various furnace makers, the Birmigham Gas Department show a section of a setting with iron pot suitable for lead and soft metals or aluminium melting, which they have designed, and which they consider satisfactory for the above applications,

and also for several other special uses—such as salt-bath work, and even the cooking of potato crisps on a large scale. A model of a varnish boiling setting designed by the Department is exhibited; and the stand is completed with several photographs of large Birmingham gas furnace installations.

A special part of the stand has been reserved for the showing of pyrometer apparatus, a microscope with specimens for examination, and a selection of the latest types of hardness testing machines such as would be employed in modern heat-treatment shops, illustrating some of the work of the Physical and Metallurgical Laboratories and Heat-Treatment Sections of the Birmingham Industrial Research Laboratories, which are not showing on their usual large scale, as the majority of the space has been allotted to the Gas Heating Section to make a special display of industrial appliances.

BLAND LIGHT SYNDICATE, LTD.,

25, Grosvenor Place, London, S.W. 1.

(Stand No. 2; Block B. 12.)

Bland lighting fittings for all purposes are found assembled here—highly artistic patterns for indoor illumination, serviceable and efficient types for streets, &c., and plain patterns for maintenance work. Vellum and silk shades are to be seen of varied colours and patterns, with glassware of all kinds for indoor and outdoor lighting. Further exhibits include, with other things, cookers, geysers, mantles, gas irons, enamelled and aluminium ware, and gas poker burners for lighting coal fires. Some of the main items of the display are further described below.

"*Nu-Met.*"—A new metal of tubular form for use in the production of brackets, pendants, &c. It is non-corrosive, has the appearance of silver, and is produced at a price only slightly in excess of brass tube. It is suitable for use with aluminium burners.

"1927 Silent" Burner.

"Purley" Indoor Lamp.

Outdoor Suspension Lamp.

1927 Bland Silent Burner (Gould patent applied for).—The patentee has determined the relationship between a given sized Venturi bunsen tube, a certain pattern of magnesia screen, and the ignition-point, ensuring perfect combustion, silent flame, and the impossibility of "lighting-back." The burner suits any condition of make or pressure, and is stated to give a duty of 300 candles per cubic foot of gas consumed.

Bland Patent Cluster Light (Gould patent).—Made in magnesia in multiples of 2, 3, 4, 6, and upwards, for use in street or domestic lighting. This cluster is stated to give a duty of 50 candles per cubic foot of gas consumed.

Bland Patent "A" Burner.—This is fitted with springless injector and ratchet primary air piece, making a perfect adjustment. It has a glass frill and an inside frosted or clear self-intensifying glass protector, which is attached to the burner with a bayonet fitting.

"Purley" Aluminium Indoor Cluster Lamp.—For shop or office use, made in 3 and 5 light.

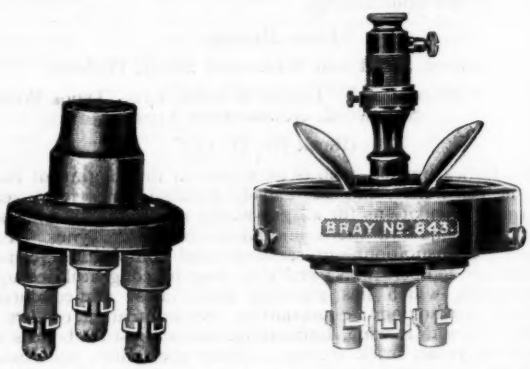
Bland Cluster Lamp No. 9848.—This is made from 3-light to 7-light; and no glass is required. It is suitable for use in factories, &c., and is fitted with a large enamel reflector.

Bland Patent Factory Burner.—A burner with an 8-in. or 12-in. reflector, fitted with bayonet catch and glass or wire protector.

GEO. BRAY & CO., LTD., Leeds.

(Stand No. 7; Block D. 13.)

This stand takes the form of a display of incandescent burners and mantles for domestic and general use, incandescent burners for street lighting, ordinary flat-flame coal gas burners, and acetylene burners. In the first-mentioned class is the popular No. 790 pattern fitted with aluminium globe-holder and deflector. This particular pattern is the most popular of all the Bray burners; for not only have the public favoured it, but the gas companies also have adopted it widely for maintenance work. During the last few years the use of aluminium in place of the pot deflector has rapidly increased, as this metal does not tarnish with the combustion products, not break with the heat.



The Metal Diffuser with Cluster. No. 843.—Three-Light Medium Cluster.

Several of the burners on view are fitted with the Bray patent diffuser. This device is claimed to be the greatest advance in the efficiency of incandescent burners made within recent years, and is designed to prevent lighting-back, irritating noise, and an unsteady light. The No. 843 is another burner to which attention may be drawn. This is particularly suitable for shop lighting and similar purposes; for it has a three-light medium cluster which gives approximately 300 C.P. Here, again, the globe-holder and deflector are of polished aluminium; or the burner can be obtained at a little extra cost with a brass globe-holder, plain polished or coloured to match any decorations. The exhibit shows the progress that has been made in the efficiency and attractive appearance of burners for incandescent lighting.

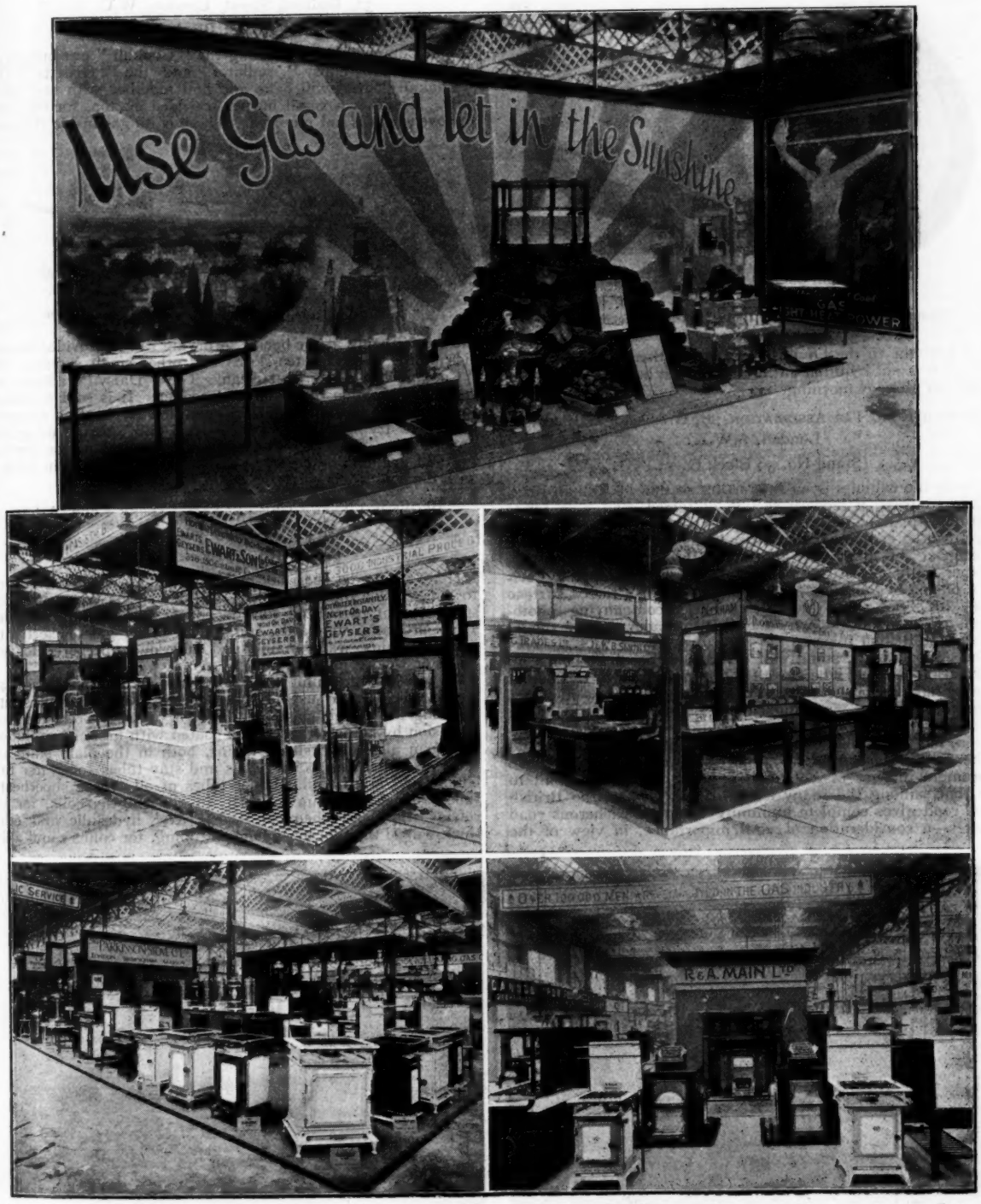
BRITISH COMMERCIAL GAS ASSOCIATION,

28, Grosvenor Gardens, London, S.W. 1.

(Block No. E. 13.)

The exhibit arranged by the British Commercial Gas Association demonstrates the national importance of coal as nature's most wonderful storehouse for providing products as essential raw materials in many national industries. It is clearly demonstrated that, by the carbonization of coal in gas-works, the innumerable and invaluable chemicals, dyes, drugs, oils, motor fuels, fertilizers, and perfumes stored in the coal may be recovered for the necessities of modern civilization, as well as for the needs of industry, instead of being dissipated, as and when the coal is burned in its raw state, in the form of soot and smoke, to pollute the atmosphere and destroy health, life, and property. One is impressed by the central attraction of the stand, designed to illustrate sun rays radiating health and light to an ideal city on the one side; and, on the other, a picture of the ideal with the housewife's workshop—the kitchen—in evidence.

The whole exhibit suggests that individual effort in adapting modern domestic science to the home and factory would incidentally ensure a clean sunlit city and a healthy, happy community. The slogan "Use Gas and Let in the Sunshine" is the keynote of the display, which indicates something of the far-reaching work the gas industry is doing for the nation, and the practical provision it makes in the solving of domestic and industrial problems. Briefly, the exhibit is one which not only appeals to the scientific mind, but acts as a remarkably telling piece of educative publicity; and it may be truthfully said to be the key to the Gas Section—suggesting, as it does, the real significance of gaseous fuel in relation to the health, comfort, and well-being of the community.



BRITISH, FOREIGN, AND COLONIAL AUTOMATIC LIGHT CONTROLLING COMPANY, LTD.,

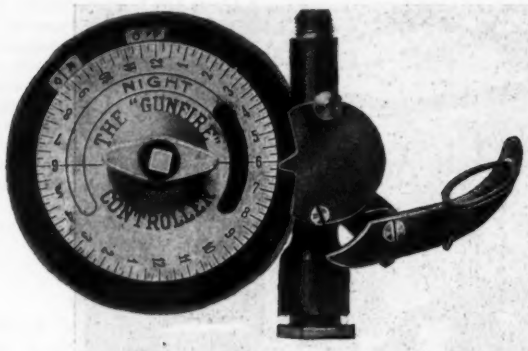
Bournemouth.

(Block No. F. 13.)

The "Gunfire" clockwork controller is shown adapted for various situations and requirements. One type of sixteen-day controller is so arranged that, should it be desired to light the lamps in case of fog or for any other purpose, this can be done by hand, and the controller will extinguish them at the proper time—the action being unaffected at lighting time. This controller can be supplied to extinguish only, after having been lighted by hand. The "Gunfire" cast-iron suspension box, with fifteen-day controller, is neat in design, and strong enough to carry safely the heaviest lamp; and at the same time, it is extremely neat in appearance. The Company also make a much smaller box in aluminium, for less heavy lamps. This also is symmetrical, and possesses a number of other noteworthy features. It is claimed to be the shortest suspension box controller on the market; the measurement being 5 in. over-all. Then there is the "Gunfire" electric time switch, with a sixteen-day lever clock of the highest quality, and identical with that which is used with the gas controllers, of which there are some 200,000 in use.

Another useful form may be mentioned—the "Gunfire" type of controller for lighting metal pots of linotype, monotype, and the like machines, and for similar purposes. In this case the controller is inserted in any suitable position in the gas supply; the by-pass or pilot light being carried to the metal pot. The

pilot should not be too close to the burner. The adjustable arm can be moved to any time at which it is required to light-up the gas. The controller is wound once a week, and the dial is fixed. When the metal is no longer required molten, the



"Gunfire" Controller, with Hand-Lighting Attachment.

tap is brought to the off position, and is then ready for next day. If it is not required on Sunday, it can be set on Saturday to light on Monday morning.

BRITISH ROAD TAR ASSOCIATION, 17, Grosvenor Gardens, London, S.W.1.

(Stand No. 3; Block G. 13.)

Among the exhibits is an interesting section of Roman road, and, in contrast, a modern section of tarred road. A series of samples of road tar, graded in viscosities over a very wide range, can be examined; and other items include an abundance of pictorial and descriptive matter on the subject of road tar, together with a series of photographs affording striking evidence of one of the most notable properties of a tarred surface —viz., its "non-skid" qualities. The accompanying photographs go far to show why the British-made product should be used for British roads.

The Association's stand can be looked upon as being an information bureau, wherein all those interested in the use of tar may have an opportunity of discussing the many questions concerning its uses and application for roads. The British Road Tar Association is an organization which, since its inception, has performed admirable work in the advancement and furtherance of tar for highway purposes, and has done much to promote the use of a British product. It is important to note that, among the many claims made for tar, the British tarred road gives complete immunity against treacherous road surfaces—a consideration of vital importance, in view of the tremendous growth of motor transport and the alarming number of accidents now occurring.

BRITISH SA-VALL COMPANY,

52, Bedford Street, London, W.C. 2.

(Stand No. 2; Block F. 13.)

The Company are exhibiting the "Cookall" one-burner gas cooker, the "Daisy" radiator, and the "Grilette." The "Cookall" oven will bake and boil together with one burner only. There is a small burner provided on top, for use when the oven heat is not required. There is no gas inside the oven;

"Daisy" Radiator.

The "Grilette."

the burner being at the back. A drying rail is provided on each side of the oven, for tea-cloths and other small articles. The "Cookall" is easily kept clean. The "Daisy" radiator is a small combination of heater and cooker. It is sold essentially for a heater; but while it is in operation for heating purposes, boiling or frying can be done on top, and toasting or grilling underneath. The "Grilette" is a dainty combination for boiling and grilling; or it can be used for boiling only, in place of an ordinary gas ring.

BROMFORD TUBE COMPANY, LTD., Rocky Lane, Aston, Birmingham.

(Stand No. 1; Block B. 13.)

Here are to be seen hot-finished weldless steel tubes, from $10\frac{3}{4}$ in. outside diameter to $1\frac{1}{16}$ in., of various types, including specimens of metallized tube in copper, aluminium, and zinc. There are lamp standards, suitable for either gas or electricity; and gas mains, water mains, and cable ducts prepared for lead joints or welded joints.

An interesting exhibit is a specimen of an 8 in. steel gas main which has been in use for over twenty years. It illustrates the long life of this class of tubing, if properly protected from corrosion by being wrapped and coated with first-class solution. The firm also show steam mains, both in the plain state and fitted with flanges; boiler tubes and stay tubes for water tube boilers and multitubular boiler tubes of all types; superheater tubes and elements up to 50 ft. in one length; coils, for the refrigeration and chemical trades, &c.; hydraulic and other thick-walled tubing; loose flanged tubing, for colliery and allied

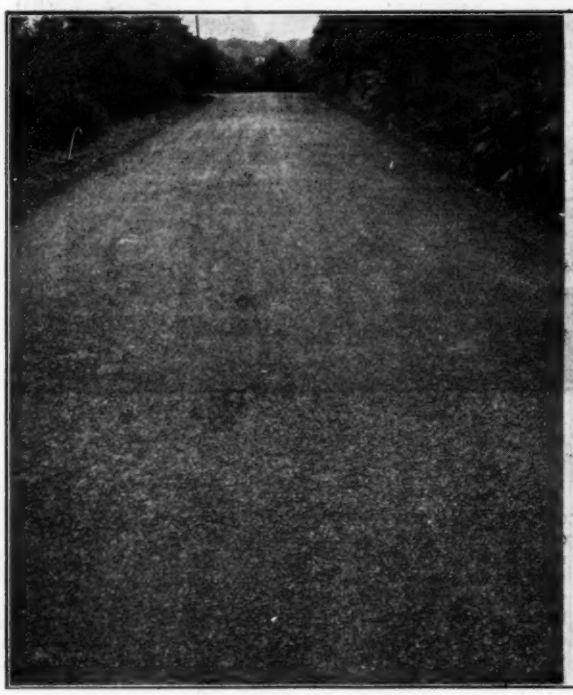


Photo of Tarred Road.

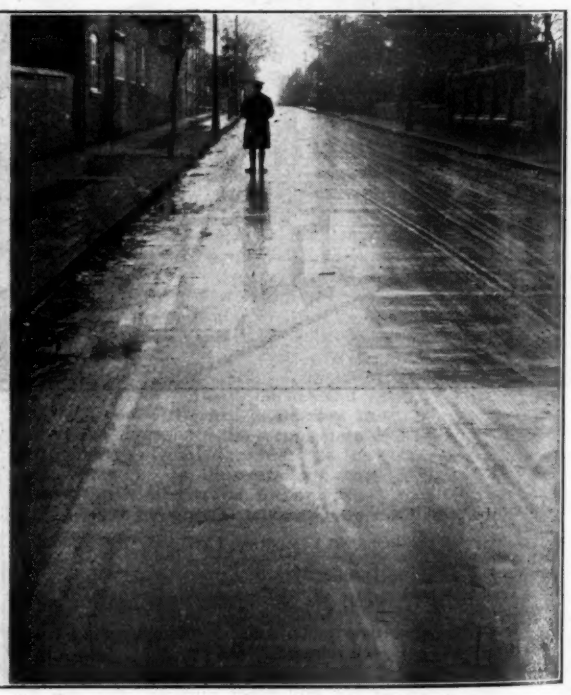


Photo of Road Made with a Substitute.

(Both Photos were taken on the same day, under identical conditions of weather.)

PORTION OF A LARGE POSTER ON THE BRITISH ROAD TAR ASSOCIATION'S STALL, SHOWING THAT SAFE, NON-SKID ROADS DEMAND TAR.

trades, including samples of the Williams and "Victaulic" joints; and specimens of weldless steel tubes rolled from special steels, including acid-resisting and heat-resisting steels.

O. BRUSTER & RICHARDSON,

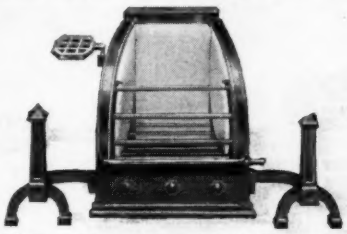
4, Lloyds Avenue, London, E.C. 3.

(Stand No. 2; Block F. 12.)

This is a firm who are, by means of their popular "Glow-Worm" boilers and fires, substantially aiding the gas industry to dispose of its coke. They are showing the following:

"*Glow-Worm*" *Boiler*.—This is exhibited in five sizes. The "Glow-Worm" boiler is constantly being improved, with a view to increasing efficiency and economy. The "No. 01 Junior," in particular, which is suitable for a hot water tank of 20 to 25 gallons capacity, is a very attractive proposition at its low price. All the "Glow-Worm" boilers, excepting the "Minor," are fitted, or can be fitted, with a shaking grate, which enables the dust and ash in the fuel to be deposited in the ashpan, thereby avoiding dust and dirt in the room.

"*Glow-Worm*" *Fire*.—The original (self-contained model) "Glow-Worm" fire is being shown in operation. It is specially designed to fit readily into any existing fireplace, either by means of a Turner surround or by using a slab of tiles.



Hearth Model "Glow-Worm" Fire, Fitted with Dogs and Trivet.

Hearth Model "*Glow-Worm*" *Fire*.—This model, which has been designed something on the lines of the "Sunbeam" gas fire, is becoming exceedingly popular. It is arranged to fit into any existing fireplace or chimney-opening without definite fixing. It may be had with or without the dogs and trivet, at very reasonable prices.

Both models are fitted with gas lighters, which make these fires almost as easy to handle as a gas fire. Burning gas coke of 1 in. to 1½ in. size, at about 40s. per ton, the cost of operation is stated to be approximately 0·3d. per hour. Nearly all households use at least one solid fuel fire; and it is claimed that the "Glow-Worm" fires, placed on simple hire, would enable gas undertakings to supply their consumers with all their heat requirements. These fires incorporate an entirely new principle of combustion, giving pure radiant heat without smoke, and with very little dust. A very definite measure of control is obtained by the movement of the ashpan. The grate itself may be filled with fuel, but the draught so controlled that the fuel is burning at the slowest possible rate of combustion. When the ashpan is pushed right in, the greatest degree of combustion can be obtained with a wonderfully quick acceleration of heat. Apart from the fact that these grates develop a big local demand for gas coke, they are the means of securing an additional gas consumption i every household.

The makers are also showing the "Glow-Worm" toaster, for use with these fires or with gas fires. The "Glow-Worm" poker is intended for lighting-up ordinary coal fires or the fire in a coke boiler.

CANNON IRON FOUNDRIES, LTD.,

Deepfields, near Bilston.

(Block No. H. 12.)

On this stand there is a good display of gas cookers of the latest designs, to meet modern requirements in the matters of efficiency, convenience, and hygiene. Another feature is the firm's new inclined fires, in black and art finishes. These fires are constructed with the radiants set at what is claimed to be the correct angle for the most efficient distribution of radiant heat. The burner and injector are on simple principles, and are designed for silent burning and small gas consumption. In radiators, there are the "Equator" gas-steam type for churches, halls, &c., and the "Belle," which is specially suitable for shops, offices, corridors, &c., where no fuel is available.

"Carnation" Inclined Fire, with Dogs.

There is also, among other specialities, a good show of cast-iron acid resisting enamel-lined chemical plant, including a gas heated furnace boiler; "Porceliron" sanitary ware; and cooking utensils.

CELLACTITE WORKS, LTD.,

296-302, High Holborn, London, W.C. 1.

(Block No. F. 13.)

There are shown here primarily "Urastone" non-corrodible flue pipes and fittings. "Urastone" is the outcome of many years' research and experience; and the manufacture of pipes and fittings of this material was commenced as the result of requests from the gas industry. "Urastone" is not exclusively a flue pipe for gas appliances, but can be used for venting other products of combustion or fumes where the temperature does not exceed 300° C. The larger diameters can be employed for ordinary chimneys and stacks, and can be bricked-in with perfect safety; chimney breasts (in the case of gas fires) being unnecessary, with resultant great economy in brickwork. The claim for "Urastone" is that it is incorrodible indoors and outdoors; the moist products being temporarily absorbed by the inside wall of the pipe, to be evaporated almost simultaneously by the warm up-draught. There is no "dripping-back" of condensation; the essential steady draught is maintained; and the pipe remains permanently clean, clear, and unaffected.

A new feature is the firm's steel-lined "Cellactite," which is immune from corrosive action of chemical fumes or atmospheric attack. "Cellactite" is a non-combustible, fibrous compound, with steel core, supplied in corrugated sheets of convenient size, equal in strength to 22 gauge corrugated iron. Resembling vulcanite in appearance, it is made in the natural black; being also supplied in surface-coloured russet, green, and aluminium. It is said to be absolutely and lastingly waterproof, non-conducting, and unaffected by heat or cold. It is light in weight—therefore saving carriage, freight, and handling, as well as weight and style of superstructure. It will not break—thus eliminating risk of accidents to workmen. A sheet at 5 ft. centres will take the weight of two men without permanent deflection. It is economical because of the saving in carriage, labour, maintenance, renewals, and construction.

W. H. DEAN & SON, LTD.,

Victoria Works, Burnley.

(Stand No. 4; Block H. 12.)

Gas heated washing coppers of different patterns are made by this firm; and there is on view a large selection of these goods, designed to meet all requirements. One that may be specially mentioned is the "Acme," which is provided with a strong steel outer casing, porcelain enamelled. This enamel will not peel or wash off with the soap or washing materials. A number of the boilers exhibited are fitted with brass draw-off tap for emptying; but they can be supplied without this fitting, if so desired. Some of the boilers, also, are supplied with wood cover, which, after use, can be reversed to form a small table; this being very serviceable in kitchens where space is limited.

There are copper water heaters and counter urns for restaurants, workshops, &c., and rustless cast-iron pan boilers specially recommended for butchers' use in brawn making and ham boiling. Stove piping, corrugated elbows, ventilating caps, tee-pieces, bafflers, &c., are shown, for use in connection with the above apparatus.

ELECTROLUX, LTD.,

155, Regent Street, London, W. 1.

(Stands Nos. 4 and 5; Block F. 12.)

Visitors may study here the motorless method of continuous refrigeration with which this firm are identified—a method which enables the gas industry to render yet another useful service.

Refrigeration will come more and more into use; and gas is in every way fitted to provide the heat which this system requires.

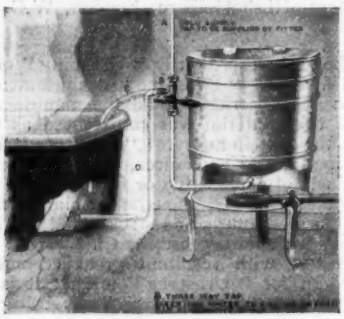
EWART & SON, LTD.,

346-350, Euston Road, London, N.W. 1.

(Block No. D. 13.)

There is a demonstration of Ewart's geysers and water heaters in full operation. The "Califont" system of water

heating ensures an instantaneous and continuous service of hot water throughout the house; only one heater being required, from which a hot water service pipe can be taken direct to the bath, lavatory, or sink. The opening or closing of the hot water draw-off tap regulates the gas under the heater; the gas burning full on only while water is being withdrawn. The "Lightning" geyser is a standard pattern for bath and domestic use constructed on durable lines, and embodying the patent automatic gas controlling valve and safety swing-out copper burner. The "Victor" and "Royal" geysers are low-priced reliable bath heaters producing hot water rapidly and conveniently. The firm also manufacture geysers to burn oil (paraffin) or solid fuel (wood or coal) for country districts where gas cannot be obtained.



No. 66 "Boilo" Gas Copper.

Ewart's "Boilo" gas copper, with patent syphonic action for supply to bath, is a recent introduction. It is fitted with a three-way tap diverting the water to copper or bath. The parts are completely detachable for renewal or repair; and in pattern No. 66 the copper pan is spun from one piece of metal without seam or joint. The "Boilo" is not intended to compete with the more rapid form of instantaneous water heater or geyser, but will provide hot water for use in cottages, small property, and for housing schemes. After turning on the cold water tap, the copper quickly fills from the bottom. The gas is then lit, and the water heated. The turning of the handle of the "three-way" tap immediately syphons the water from the copper into the bath; a further movement of the handle and the turning on of the cold water supply tap allows the cold water to flow directly into the bath to mix with the hot water already therein, until the desired temperature for the bath is obtained.

The "Ever Ready" boiler of the firm is specially designed to supply boiling water in a continuous stream for restaurant and café use. Within sixty seconds from lighting, boiling water commences to flow; and by an ingenious arrangement of the inter-locking device, the contents of the boiler always remain at boiling-point for instant withdrawal when required. The "Radion" circulator and cylinder are adaptable to existing circulating systems, and may be used in conjunction with, or independently of, the existing range boiler. The "Supreme" geyser provides automatic hot water service to bath, basin, and sink at the rate of 2½ gallons per minute, and is particularly suited to flats where space is limited.

An item of interest on this stand is one of the largest geysers ever made, supplying 16 gallons per minute, the water being heated instantaneously while passing through the apparatus.

FALK, STADELMANN, & CO., LTD.,

83 to 93, Farringdon Road, London, E.C. 1.

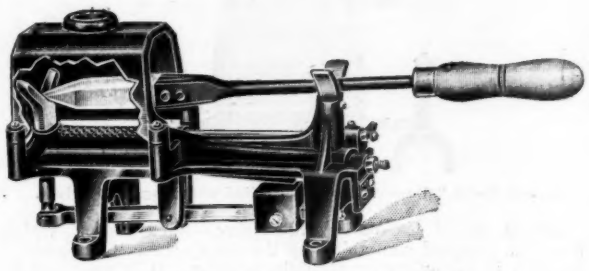
(Stands Nos. 4 and 5; Block H. 13.)

The firm are co-operating with other makers in a gas mantle manufacturing exhibit, where some of the more important processes are shown in actual working order.

Adjoining this exhibit, Messrs. Falk, Stadelmann, & Co. have a separate stand of their own, where they are displaying in a showcase the various chemicals and materials used in the manufacture of "Veritas" mantles, as well as a range of qualities of the "Veritas" mantle in finished condition. Apart from this, there is a full set of "Veritas" inverted burners, which are made at the firm's own works in Birmingham. This includes the latest model introduced this year—the "Veritas-Duplos" inverted burner—the chief merits of which are that all parts exposed to the attacks of gas fumes are made of non-corrodible material, whereas the external parts are made of brass, which can be finished to suit the colour of the fitting. There is also the "Veritas" maintenance burner, fitted with patent two-piece magnesia nozzle, with perforated disc. Other novelties include a range of metallized street lighting burners, which are fitted with the patent "Veritas" gradual-action gas adjuster, which is not affected by the most severe vibration.

In addition to a number of gas cookers and gas fires (which the firm are producing on the most up-to-date lines), there is

"Veritas-Duplos" Burner.



"Novo" Automatic Soldering Iron Heater.

shown the latest of their specialities—the "Novo" automatic soldering iron heater. The act of placing the soldering iron on the heater causes the burner to light automatically (from the by-pass); by removing the iron, the process is reversed.

SIDNEY FLAVEL & CO., LTD.,

Leamington.

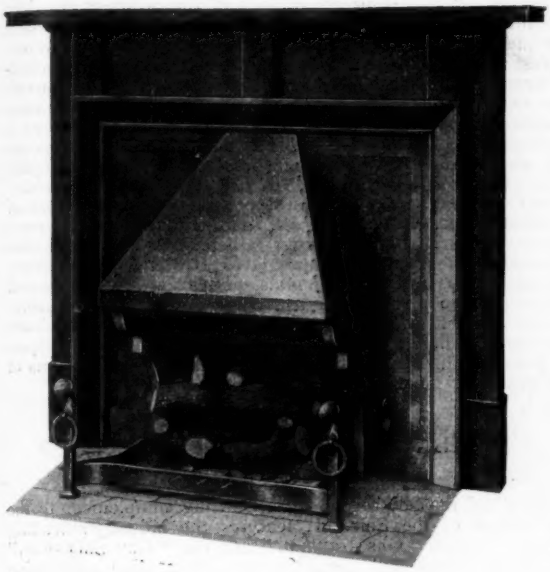
(Stand No. 1; Block F. 13.)

On this stand are shown cookers, the boiling burners and double griller of which are carried on a loose frame, which may be lifted out bodily, complete with fittings, leaving a clear space for cleaning the back splasher and crown plate. The ovens are packed with Bell's cellular asbestos blocks, which are said to retain their original insulating efficiency during the whole life of the cooker.

The Flavel boiling burners are constructed on new principles for which patents have been granted. One principle of this construction is to make an efficient mixture of gas and air by circulating these elements in a peculiar spiral motion which produces perfect combustion on ignition. The gas burns with an intensely hot flame, and obtains the greatest heating power from the gas consumption, or conversely the smallest gas consumption for the heat produced. The opening from which the gas flame issues is machined to precise limits, so that there are no variations in the size of the discharge apertures in burners, and the size of the flame is always the same when the gas is turned full on. Another feature of the Flavel burner is the air trap. By depressing the finger plate of the air trap before lighting the burner, the air is cut off and the burner lights silently. When this operation is repeated before turning off the gas, the flame goes out without noise. The air traps are fitted with screws which can be set to regulate the air supply to the burners; and such adjustment is not affected by the use of the finger plate. The regulation of the gas supply is effected by a regulator attached to the burner taps.

There are gas fires of different patterns, fitted with the Flavel self-centring burner. The gas injector delivers an accurately centred supply to the burner. There is a fuel-registering carrier which is cast integral with the burner, and exactly centres the fuel radiants over the burner nipples. The brick back is studded to increase radiation, and is shaped to carry hook-pattern fuel. The gas-mixing tube has a series of graduated slots on the lower side; and the efficient mixing of gas and air takes place before reaching the burner nipples. The burner is silent in action. There are also gas mantel registers, with the mantel made perfectly plain, in order not to harbour dust.

Log Type Gas Fire.—Log type gas fires shown are of fireclay; and part of the front, which is of similar construction to the refractory brick back and fuel of an ordinary gas fire, is heated by a bunsen-type burner. In addition, there is a second luminous flame burner (using a very small amount of gas), which ignites through various apertures in the logs, giving a



Log Type Gas Fire.

Coke Fire, with Gas Lighter.

FLAVEL FIRES.

realistic flame. There is an independent regulator, so that the appearance of burning logs can be advanced or retarded as required.

Coke Fires.—The firm also exhibit grates for burning all coke. These are lighted by means of a gas burner. The special feature is the bars, which give an efficient supply of air to prevent the fire becoming clogged with ash. The extra-well insulated fire back ensures a maximum radiation of heat into the room. The coke fire is applied as an adaptor to convert coal-burning grates, or a complete unit to stand alone or in front of an existing fireplace, or to stand in an open chimney, or as a mantel register fitment for new houses.

FORTH AND CLYDE AND SUNNYSIDE IRON COMPANIES, LTD.,

Falkirk.

(Block No. C. 13.)

These manufacturers are showing a comprehensive selection of gas appliances—including their "Gasecon" and "Regulus" cookers. The all-enamelled, ever-clean cookers make strong appeal; while the "Easy Reach," "Standard," and other cookers displayed show the minute care taken in every detail of construction, efficiency, and finish.

Among a wide range of framed and inset gas fires, special attention is attracted to the "Silent Knight" inset pattern. As its name indicates, this fire burns without a murmur. It possesses great heating power, and is of pleasing design; while it is said to call for a minimum consumption of gas. In the matter of gas boilers, attention may be drawn to the "White Knight" and the "Julian." Being square in construction, they are most adaptable to corner positions in the wash-house. The "White Knight" has an all-enamelled casing and cover; while the "Julian" has a cast-iron casing, aluminium coated, and galvanized cover, and is suitable for "bungalow" dwellings. Gas-heated hot water circulators, hot closets, boiling tables, and an excellent selection of gas fire bedroom mantel grates, complete the exhibit.

GENERAL GAS APPLIANCES, LTD.,

Guide Bridge, Manchester.

(Block No. E. 13.)

This firm exhibit an entirely new gas cooker, which has been aptly named the "Governor-General," with thermostatic control. It is a development of the single-burner gas oven, introducing, it is pointed out, a new principle in the method of improved heat circulation in the oven obtained by means of the patented front bottom flue device in the door, which is connected to the dome, and finally to the flue outlet in the usual position at the top of the oven. There are claimed as features of this cooker marked progress in scientific construction, economical efficiency, reliability, utility, and cleanliness. It is supplied in a variety of finishes.

General Gas Appliances are also making a special display of the "High Peak" series of art metal gas fires, with cast-iron fronts covered with hammered copper, brass, or pewter.

GIBBONS (DUDLEY), LTD., and GIBBONS BROS., LTD.,

Dudley.

(Block No. C. 12.)

A representative display of Messrs. Gibbons' refractories is shown on this stand, including ordinary and No. 1 grade fire-bricks, highly aluminous bricks, silica and siliceous bricks, and carborundum bricks. There are also specially-shaped blocks and tiles in these materials.

Messrs. Gibbons Bros. display a full-sized section of their patent Dressler tunnel kiln for the firing of various kinds of bricks, tiles, and pottery ware. These kilns are now being extensively used in many countries, and have been developed to a very high state of perfection in the United States. The firm have recently acquired the American rights for this country, and are showing the American type of combustion chambers, with rebated joints, for the first time.

An item of considerable interest to gas engineers and colliery and coke oven proprietors and managers will be the sectional models of Gibbons-Kogag regenerative coke ovens. These ovens are said to represent the latest Continental practice; and photographs and drawings of recent installations can be seen at the stand. Photographs and literature relating to the Company's well-known metallurgical furnace are also exhibited.

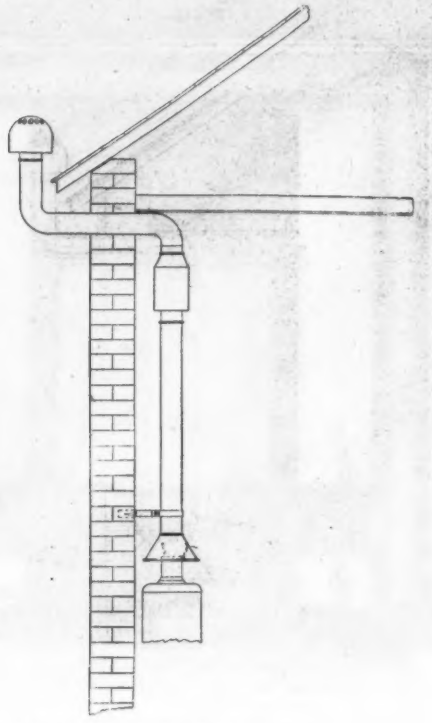
T. S. HALL,

101 and 102, Redcliff Street, Bristol.

(Block No. F. 13.)

The need for efficient ventilation in connection with geysers fitted in bathrooms is unfortunately emphasized by accidents which would not have occurred had such ventilation been provided. It is well understood in the gas industry, and should be made generally known. Fittings for securing efficient ventilation are manufactured by this firm; the parts consisting of a patent baffler, patent cowl, hood, and flue pipe. The galvanized hood is for fixing over the geyser, for the purpose of collecting the fumes, and also to aid up-draught through the outlet pipes provided. The specially constructed baffler assists up-draught, and prevents back-draught—the back-draught being responsible at times for the lighted geyser being blown out. The special patent cowl (known as the "Roventa" cowl) prevents back-draught, and, in conjunction with the baffler, makes for double security. These fittings have been subjected to some very severe tests, which have proved conclusively that proper venti-

lation can be effected by the use of the right appliances, and the dangers associated with back-draught be thus obviated.



Geyser Ventilating Fittings.

Many other useful articles are to be seen on the stand. Mr. Hall specializes, as a manufacturer, in copper geysers, water boilers, tea urns, gas stove fittings, and gas stove replacements in the form of grill pans, double roasting pans, toasters, oven shelves, and oven grids. There are also specimens of gas meter shelves.

HORSTMANN GEAR COMPANY, LTD.,

Newbridge Works, Bath.

(Block No. C. 12.)

"Newbridge" gas controllers, which, including the clockwork mechanism, are made at the above-mentioned works, cater for every conceivable requirement in connection with street and shop lighting; and many of the different types are to be seen on the Company's stand. They can be had to light and extinguish at times set by hand; to light and extinguish at times automatically adjusted to an annual schedule; to extinguish the pilot during lighting hours; to light a group of burners, extinguish a portion at midnight, and the remainder at dawn; to select certain days for non-operation; to remain inoperative during a moonlight period, while, if desired, at this time the lamps can be lighted manually; for hand operation during fog, &c. They may be quick lighting or gradual lighting; and all types of "Newbridge" controllers have gauged interchangeable parts. In the case of the "Uni" controllers, the clockwork movements are detachable and interchangeable without disturbing any gasfittings.

HURRY WATER HEATER COMPANY,

39, Broad Street, Birmingham.

(Stand No. 4; Block B. 12.)

This exhibit comprises specialities principally for non-parlour and parlour type houses. The "Magic" Hurry gas furnace is for non-parlour houses, and is a special dual-purpose machine —*i.e.*, for washing clothes and delivering hot water to bath at few minutes' intervals, on a method that is as sanitary as it is possible to be, considering the machine also has to wash dirty clothes, &c., of all kinds. No scum or sediment is delivered when supplying the bath. By introducing this method, the firm have been instrumental in displacing a large number of coal heated appliances, in favour of gas heated ones on various large housing estates. Where there is a large family, the furnace is probably in use daily for bath purposes, and not for washing clothes only, which would mean only one day a week in use. Practically all the firm's contracts are for gas heated coppers; and consequently they claim to have obtained considerable success in furthering the cause of gas consumption.

There is also shown in use a No. 10 gas heated cylinder for parlour type houses, which supplies hot water to bath, lavatory basin, and kitchen sink on a safe principle.

INCANDESCENT HEAT COMPANY, LTD.,

Cornwall Road, Smethwick, Birmingham.

(Block No. C. 13.)

The exhibits of this firm include their new type fully recuperative natural draught town gas fired furnace. This embodies a highly efficient recuperative system. The furnace is shown working at temperatures said to have been heretofore unobtainable with town gas and natural draught. It embraces the rapid heating advantages of the ordinary standard type furnace, in addition to a complete recuperative system principle without complications. There are also typical examples of the Company's small standard furnaces—including oven and muffle types, suitable for the small heat-treatment shop or tool room, and for general purposes where temperatures up to 1000° C. are required. Other exhibits are a simple hot brass stamping furnace, which has been successfully adopted by both large and small non-ferrous stamping works; and a small example of a high-speed steel furnace.

The Company display examples of work produced in some of their automatic, continuous, and semi-continuous furnaces—including a variety of stampings which have been bright-annealed after the various stamping operations. These embrace both non-ferrous and ferrous metals, samples of bright-annealed steel strip, ferrous and non-ferrous wire, and a number of components which have been hardened and re-heated in their heat-treatment machines. There are available for personal inspection photographs and drawings showing the newest designs of heat-treatment machines.

WALTER KING, LTD.,

11, Bolt Court, Fleet Street, London, E.C.4.

(Stand No. 8; Block F. 13.)

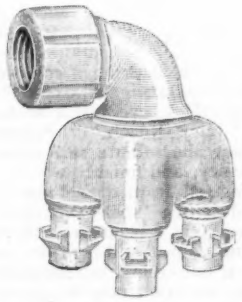
This stand may be regarded as a fitting complement to the Gas Section of the Fair. It features the industry's leading publications—the "GAS JOURNAL" and the "GAS SALESMAN." The former (with one exception the oldest class publication in the country) has given almost eighty years' continuous service to the gas industry; while the "GAS SALESMAN," which was started in 1922, is the only publication devoted exclusively to the rapidly-extending sales and service branch of the gas industry. A striking example of the progress of the "GAS JOURNAL" is afforded by a comparison of the first and the latest volumes, which are shown side by side.

LIGHTING TRADES, LTD.,

30-31, Farringdon Street, London, E.C. 4.

(Block No. H. 13.)

Lighting Trades, Ltd. (who incorporate J. & W. B. Smith, Ltd.), are showing specimens of the many types of "Ironclad," "Volker," and "Zeimar" incandescent mantles which they manufacture. Examples of some new and high-class lighting fittings are also included; and these demonstrate that beauty of design can as well be applied to gas fittings as to those employed with other illuminants.



"Renown" Superheater Burner.

A feature of the exhibit of special interest is the display of "Renown" magnesia superheater burners, which were recently introduced. This is the first exhibition of importance at which the superheater burners have been shown; and demonstrating burner rails have been installed to give those interested an opportunity of inspecting them under normal working conditions. Specimens of "Glasmi" portable gas fires are also on view.

MABBOTT & CO., LTD.,

Phœnix Iron Works, Poland Street, Manchester.

(Block No. F. 12.)

The fish frying trade is one in which the gas industry is taking an increasing amount of interest; the potentialities of the fish frier from the point of view of gas consumption being great.

This firm are exhibiting a fish frying range of an entirely new type. The usual practice has been to construct these ranges of tiles and ironwork. In the range here shown there

are no tiles, but there is used as a substitute a special type of material which, while being quite as effective, is not subject to cracking or discolouring as is the case with tiles. The gas burners are of the firm's own construction; and they maintain that they are the most economical and effective gas burners for the purpose at present on the market. The type of burner used is the "Mabbott Unit" gas burner, which can be fitted with anything from two to five units, according to the size of pan, and is so constructed that the whole of the bottom surface of the pan is heated. The consumption of gas for a full five-unit burner is 135 c.ft. per hour.

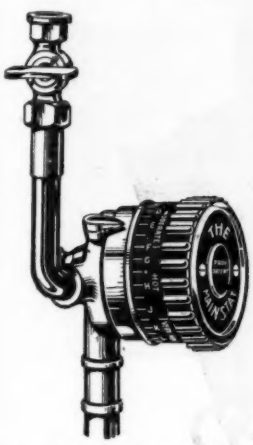
The outstanding feature of novelty about this range is, however, the pans, which are made of stainless steel, for which the firm have appropriated the name of "Staicleen" pans. The pans are very highly polished inside, and will always remain so. They have a lifetime's wear, and are excellent heat conductors; so that the consumption of gas is the lowest possible. These pans can be had in any size, to suit customers' requirements. It is Messrs. Mabbott's view that these pans, owing to the small consumption of gas they require, will be the strongest argument the gas manager can have in inducing the fish friers in his area to adopt gas.

Other exhibits comprise a roasting oven, carving table, boiling table, and vegetable steamer.

R. & A. MAIN, LTD., Gothic Works, Falkirk.

(Block G. 12.)

In this exhibit of Main gas cooking and heating appliances there are many notable examples, including the latest productions in cookers—the "Mainamel" (all-enamelled) in "Deluxe" and "Mottled" finishes. In these finishes the whole of the cooker body, inside and out, including the cast-iron back, the base, door frame, door, fixed crownplate, the entire oven and oven fittings, the stand legs and stand, the bridges, burner supports and hotplate bars are enamelled; and the cornice itself is fully enamelled. The taps are finished with non-tarnishable plating, which keeps bright without any cleaning with metal polish.



The "Mainstat" Automatic Cooking-Control.

The cookers are also fitted with the patent "Conservor" oven, and the "Mainstat" automatic cooking-control. The latter is the result of years of closely applied experimental work, devoted to the production of a gas oven thermostat that could be considered as unexcelled in accuracy, wide range of settings, sturdiness, and general suitability for the work it has to perform.

There are also shown on the stand gas fires of inset and upright designs, and in many finishes, as well as gas appliances for housing schemes, and large cooking apparatus for hotels.

MANTLE MANUFACTURERS' JOINT EXHIBIT.

(Block No. H. 13.)

With the object of giving visitors to the Gas Section an opportunity of seeing something of the making of goods they are asked to buy, a working exhibit showing the manufacture of incandescent gas mantles has been arranged jointly by the following companies:

FALK, STADELMANN, & CO., LTD.
LIGHTING TRADES, LTD.
J. T. ROBIN, LTD.
WELSBACH LIGHT COMPANY, LTD.

These are the four principal manufacturers of gas mantles in England to-day; and they are equipped to supply them of every description.

On a small stand, it is not possible to demonstrate each of the many separate processes necessary to the manufacture of the gas mantle; but a good idea of the intricate nature of the work involved will be gained from the principal processes which will be performed on the stand by competent operators. These include knitting of ramie yarn, sewing of inverted mantles and ring fixing, sewing and looping of upright mantles, fixing or strengthening of the vulnerable parts of mantles by chemical solutions, and shaping and hardening of both upright and inverted mantles by means of high-pressure gas. There will also be displayed on the stand specimens of the raw materials and chemicals used.

MELTHAM SILICA FIRE BRICK COMPANY, LTD.,

Meltham, near Huddersfield.

(Stand No. 1; Block B. 12.)

The Company have an interesting display of their silica refractories for gas, coke oven, glass, and steel works; the principal feature being a section of vertical retort as supplied to the Woodall-Duckham Vertical Retort and Oven Construction Company, Ltd., for their various contracts. There are also a section of silica horizontal retorts and combustion chamber, as supplied to Messrs. Drakes, Ltd., Halifax, a small silica section of coke oven lining showing blocks similar to those now being supplied for batteries erected by Messrs. Simon Carves, Ltd., of Manchester, and other constructors, and a general exhibit of the firm's different manufactures.

METROPOLITAN FUEL COMPANY, LTD.

Millbank House, Wood Street, London, S.W. 1.

(Block No. E. 13.)

"Cox's Ignite Combustor" (for the surface combustion of gas), adapted to various purposes, is shown by the Metropolitan Fuel Company. Its application, indeed, covers the whole range of industrial and domestic heating operations. It is available for use in atmospheres which normally would not support combustion. As an instance of this, it may be pointed out that the "Combustors" can be employed in a totally enclosed core oven with no means of air admission, and with only a small orifice to permit of the escape of steam and other products which it is desired to drive off.

Two 12-in. diameter "Combustor" burners are shown in operation, with various patterns of bricks; and there is also a large "Combustor" of the type used for singeing cloths—for which purpose, and the heating of drying chambers, firms in the textile industry have for several years been using this system, increased rapidity of operation being thus obtained. Other applications illustrated include soldering iron heaters, metal melting pots, and furnaces for annealing. In addition to these, there is a glass demonstration water tank, fitted with silica tube and two "Combustor" burners, to show the application of the system to water heaters and solution tanks; and there is also an enamelling oven employing "Combustors," and thermostatically controlled.

METROPOLITAN GAS METERS, LTD.

Hyson Green, Nottingham.

(Stand No. 3; Block B. 12.)

This exhibit comprises an assortment of dry gas meters and clock controllers for public lighting. There are glass-panelled show meters of the "Metro" slot and high-capacity types; a "Metro" slot meter with a special form of lift-up money box, which has been designed for use where the meters have to be placed in such positions that the standard "draw-out" money box type cannot be fixed or conveniently handled; and a stop-action meter, which can be set to give any quantity of gas up to 6500 c.ft.—the gas being shut-off when the determined amount of gas has been consumed. The mechanism of the last-named meter is entirely separate from the index.

Another interesting meter which can be examined—and in connection with which a patent has been applied for—is a stop-action "Ration" meter. This meter is so constructed that it can be set to deliver a predetermined quantity—anything up to 650 c.ft.—of gas, which cannot be exceeded. This setting cannot be altered without the use of the special key provided. Provision is made for the ration to be provided by the holder of one key; while the limit of ration is under the control of another key. There are also shown three sizes each of "Standard" slot meters and ordinary meters. With the former, prepaid gas is clearly indicated on an extra large scale in the front of the meter.

There are models of the "Duplex" clock controller, and specimens of several types with burners mounted for demonstration purposes, for group lighting, and for suspension lamps, &c. This controller is fitted with a swivel connection, allowing the by-pass to be turned away from the mantle when renewing or adjusting same, thus minimizing risk of breakage. It can be set to act once or twice during 24 hours, by simply arranging the tappets; and it is fitted with a patent joint which allows it to be taken out of the lamp without disturbing the connection. The Godson by-pass has a very low gas consumption, and except under abnormal conditions will not blow-out.

MIDLAND BRASS FITTINGS COMPANY,

Aston Road, Birmingham.

(Block No. H. 12.)

There is exhibited by this firm a patent safety gas cock which should make a direct appeal to the trade by reason of its simplicity and effectiveness. It cannot get out of order; and it cannot fail to function.

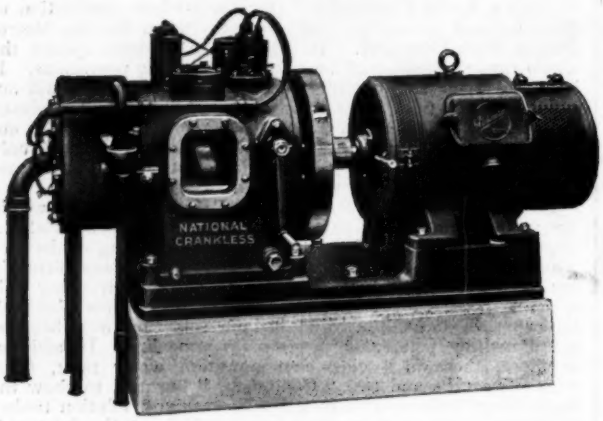
Designed to prevent the accidental turning on or off of a gas oven or gas fire cock, this ingenious device admirably fulfils its purpose. Moreover, it has the supreme merit of being absolutely self-acting; the force of gravity automatically throwing the lever out of position, after the tap has been turned on or off. It has the full smooth gas-way which is a speciality of all "Midland" fittings.

The firm also show some useful "gadgets" in meter connections, together with a comprehensive selection of general

gas fittings. Their Slot and Housing Scheme lines at competitive prices, incorporating as they do every known improvement, are designed to cater for the modern demand. Nothing but solid-drawn tube is used, which (together with cast cocks, cast swivels, and large gas-way) definitely ensures reliability and service in every department. "Midland" main cocks have a full smooth bore and a parallel gas-way from inlet to outlet.

NATIONAL GAS ENGINE COMPANY, LTD.,
Ashton-under-Lyne.
(Block No. C. 13.)

The exhibits of this firm include a 10-H.P. "National-Michell" crankless gas engine and a "C" type gas engine.



10-H.P. Crankless Gas-Engine.

"National-Michell" Crankless Gas-Engine.—This engine is a new type of 10-H.P. capacity at 1200 R.P.M., working on the four-stroke cycle, using town gas as fuel. The particular feature of this engine is the elimination of the crank and the substitution in its place of a slant mounted on the main shaft. Three cylinders are arranged equally spaced round the slant, and are parallel to the shaft, instead of at right angles, as in the crank engine. The thrust of the piston is imparted to the slant by means of a Michell thrust slipper with a spherical seat. A reference to the illustration will show that this arrangement provides a very compact engine, reducing to the minimum the mechanism between the piston and the shaft. By proportioning the slippers according to Mr. A. G. M. Michell's patents, ideal conditions of lubrication are obtained, reducing friction to a minimum, and enabling high surface speeds to be used on the face of the slant. The engine is direct-coupled to a generator by means of flexible coupling.

"National" Engines.—These engines are the development of over forty years' experience. The working parts are few; and all the latest improvements are embodied, together with special features covered by the firm's own patents. The design secures accessibility to all bearings and working parts; and the general provisions are such that the effects of wear, the amount of fuel and lubricating oil consumed, ease of cleaning, and other important features are on the most efficient lines. No special skill is required for attending "National" engines; and they are suitable for all classes of industry. Upwards of 50,000 "National" engines (totalling millions of horse power) have been supplied, and are giving excellent results in all parts of the world.

OUGHTIBRIDGE SILICA FIREBRICK COMPANY, LTD.,
Oughtibridge, near Sheffield.
(Block No. F. 12.)

Silica bricks and blocks for gas-works purposes are shown by this firm, as well as others for bye-product coke ovens.

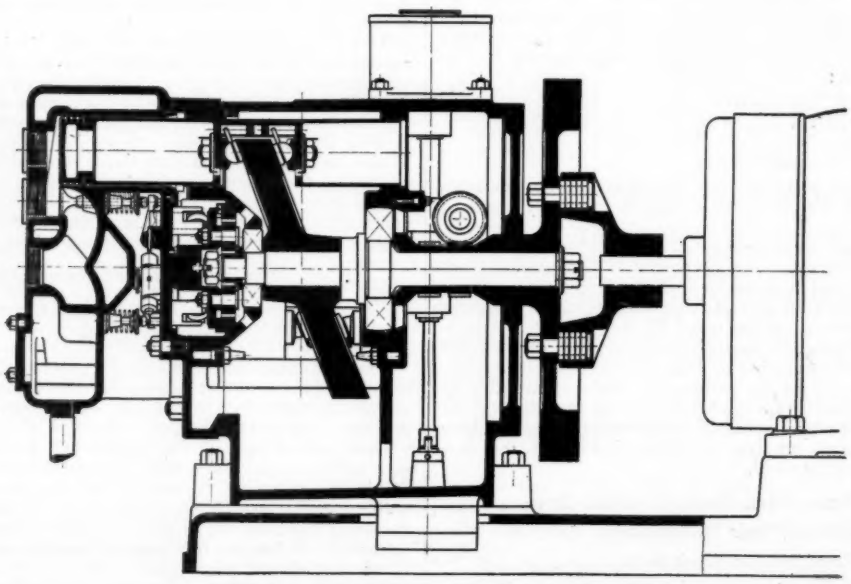
In addition to gas retort sections in silica material as supplied to the Woodall-Duckham Companies and Messrs. Drakes, Ltd., there are silica bricks, blocks, and cement for gas-works. For steel works, there are bricks and blocks of various special materials—an interesting exhibit in this connection being the "Metalkase" magnesite brick. There is also on the stand for inspection a sample of the firm's best Oughtibridge ganister and quartzite rock, from which their silica products are manufactured.

PARKINSON AND COWAN (GAS METERS), LTD.,
Fitzalan Street Works, Kennington Road, London, S.E. 11.
(Block No. B. 12.)

This firm show on their stand a complete range of gas meters of every description, including those of the wet and dry types,

"Blackpool" Lamp.

both for ordinary consumers and for those supplied on the prepayment system. Their exhibit covers a great variety of patterns, and includes high-capacity dry meters of the latest designs, and distinctive types of wet meters, including particu-



SECTIONAL VIEW OF CRANKLESS GAS-ENGINE.

larly the "Duplex." The rotary meter is also shown. Moreover, where, owing to considerations of space, it is impossible to show the actual article—as, for instance, a large station meter—models of the different patterns are displayed to illustrate the designs.

Another section of the firm's display deals with outside lighting for street and outdoor spaces generally. A varied assortment is shown, including the latest types of pre-heated inverted burners fitted in square, circular, and hexagonal lamps. Gas arc lamps are on view; and a special feature in all these patterns is the ease with which both gas and air can be adjusted from the outside while the lamp is alight. The burners are shown metallized, to prevent corrosion.

There is also on view the "Blackpool" lamp with the burners arranged in tiers. This design produces a marked increase in the illuminating effect obtained from a given number of mantles, since it avoids to a very great extent the loss caused by the mantles screening one another. Also the fact that the mantles are set farther apart increases and improves the diffusion of the light. This pattern is, of course, designed mainly for important positions; and the advantages obtained are more marked with a large unit. The original design was for mantles in two tiers; but where a large number of mantles are employed, a third tier is now added, and the advantages in illuminating effect and diffusion are, of course, correspondingly increased by the addition of the third tier. This principle of arranging the burners in tiers is also shown in high-power arc lamps, in which the method is equally effective.

Another novel item in this section is the "Economy" cock, provisionally protected. This is designed to prevent the waste of gas caused by the common practice of leaving the by-pass on while the lamp is alight. The ordinary lever cock, if arranged to turn out the by-pass, has to be operated very slowly, or the burner will not light. The "Economy" cock, by a simple alteration of the lever, reduces the speed of operation, and thus ensures the burner lighting. The same principle can be applied to a cock worked with chains; and both types are shown. The value of the economy effected can be estimated from the fact that each by-pass burning one-fourth of a cubic foot per hour will, during one year, consume during the hours the lamp is lighted about 1000 c.ft.

Other special features of the exhibit are pressure gauges in great variety of design, including single tube gauges. There are also shown retort house governors with distance control, station governors, vaporizers for overcoming the naphthalene difficulties, the "Stella" water meter, and other apparatus. The "Beasley" recording gas calorimeter is shown in action, fitted with the patent correcting device, which so controls the volume of gas delivered to the burner that the record gives the results in B.Th.U. per cubic foot automatically corrected to normal temperature and pressure. As the patent escapement meter also works at its proper speed irrespective of variations in the density of the gas, and the water-lining of the meter is now automatic, the calorimeter as shown requires very little attention, and is, notwithstanding this, an extremely accurate instrument.

Parkinson Stove Company, Ltd.,

Stechford, Birmingham.

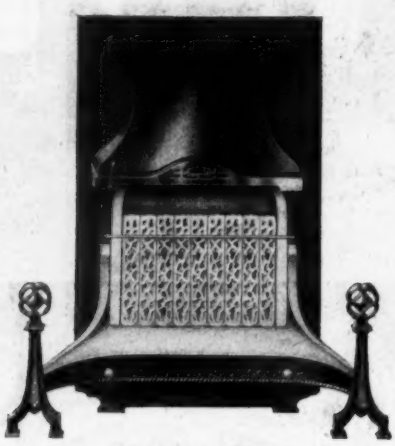
(Stand No. 2; Block C. 12.)

There is here a representative display of cooking, heating, and hot water appliances.

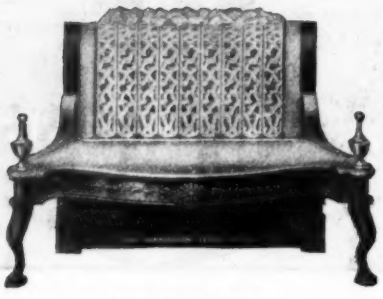
Taking the exhibits in the order named, it may be mentioned that a special feature is made of high-grade porcelain all-enamelled cookers in various shades. Prominent on the stand are six models of the "Suburbia" cooker, with oven heat control thermostat. The distinctive features embodied in this series are: Rounded corners of oven (to facilitate cleaning), the sides, back, and door of which are packed and enamel lined; self-locking oven grids; detachable and interchangeable swing gates; and high efficiency hotplate burners, with improved top bars. The "Holborn" cookers have many features which make for comfort in the kitchen. The oven is packed and lined to retain the heat; and the hotplate is spaced for convenient use. The burners (as in all Parkinson cookers) are scientifically designed to give rapid and intense heat with the utmost economy of gas consumption. Of "Standard" cookers, four examples are shown. The success of the first three sizes has warranted larger sizes being made; and these will be available shortly. One-level combinations are exemplified by the No. 3 "Stan-

dard " and the " Cabinet " models. The Company, alive to the great demand for a moderately priced cooker, combining reliability and economy, have designed the " Liverpool " and " Kennington " series.

The latest patterns of gas fires are shown, in various finishes. The Company make a special feature of convection-radiant gas fires, and have during the year extended their range of " Conrad " fires by the introduction of two new attractive models, named the " Crown " and the " Brilliant." The term



The "Crown" Fire.



The "Cosie" Fire.

" convection-radiant," as used in connection with gas fires, signifies a fire constructed to give pure radiant warmth with a high percentage of convection efficiency. By means of a suitably lagged heating chamber, pure air is drawn-up through the cold air inlet at the base of the stove, and emerging above the radiant rays of the fire, diffuses a current of pure heated air through the room. The air inlet is raised sufficiently above the base of the stove to prevent dust particles being drawn into the chamber. Distinctive in appearance, and specially designed to fit in front of an existing coal grate, are the four examples of Parkinson " Cosie " gas fires, one of which is shown alight, in an artistic tiled setting. Four alternate types of fender may be fitted to the " Cosie," ensuring a wide range of adaptability in varying settings. There are also " built-in " gas fire registers, one of which has been specially constructed to swing out, in order that visitors may examine the flue arrangement.

This comprehensive display is completed by many types of geysers and water heating appliances; gas heated rustless wash boilers; and large gas cooking apparatus, for use in hotels, works canteens, restaurants, &c.

RADIATION LIMITED,

(Block No. E. 12.)

This exhibit comprises the latest models of gas fires (many of them " live ") and cookers. The fires are in all patterns and finishes, on the " Injector-Ventilator " principle; while the cookers are of the " New World " pattern, with " Regulo " control, and in " Rado " mottled-enamel finish. There are also hot water circulators, geysers, radiators, gas irons, and various other appliances in which gas is used for both domestic and commercial purposes.

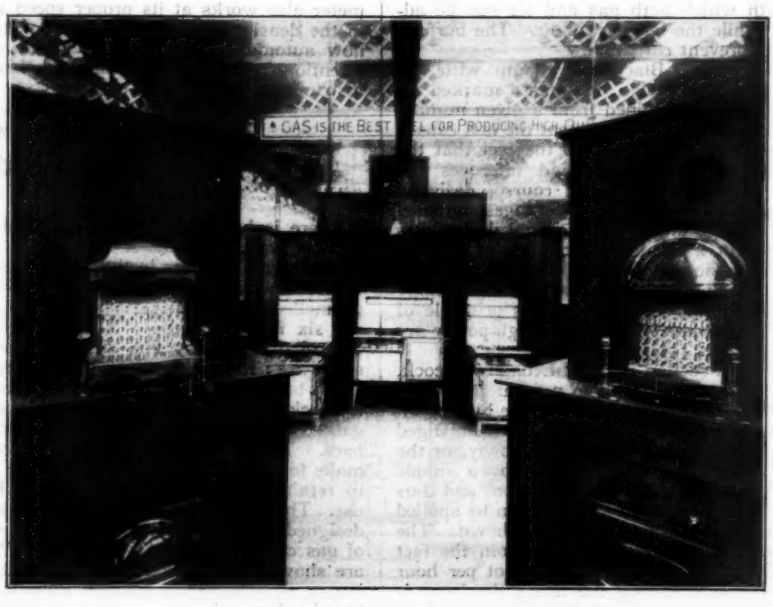
The following six firms are associated in Radiation Limited; and the appliances they severally exhibit, while differing in exterior design, process of finishing, &c., all incorporate very advanced features of construction that have been developed or improved in the Radiation Research Laboratories:

ARDEN HILL & CO., Essex Works, Aston, Birmingham.
DAVIS GAS STOVE COMPANY, LTD., Diamond Foundry, Luton.
FLETCHER, RUSSELL, & CO., LTD., Palatine Works, Warrington.
RICHMOND GAS STOVE AND METER COMPANY, Grappenhall Works, Warrington.
WILSONS & MATHIESONS, LTD., Carlton Works, Armley, Leeds.
JOHN WRIGHT & CO., Essex Works, Aston, Birmingham.

The " Regulo-Controlled New World " Gas Cooker has a single oven burner; and the flue is at the bottom of the oven, instead of at the top. The oven heat is automatically controlled by means of the " Regulo," which has a graduated dial at the side of the oven. This may be turned to give a number of cooking heats, and maintains them indefinitely, no matter what variations in pressure or quality of gas may be experienced. The hotplate boiling burners are the " Rado " high-efficiency type, with flame openings so designed that they cannot become clogged when food boils over. A cooking chart is provided; and a complete and carefully indexed cookery book is available, giving the necessary dial-setting for every dish. All that the user has to do is to set the " Regulo " dial at the given figure for the cooking in hand, note the time given for the cooking, and insert the food. Until this time has expired, the oven door need not be opened.

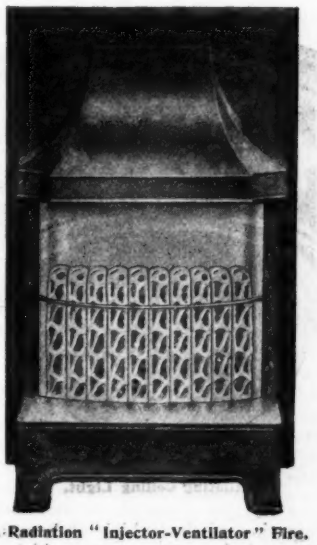
With the " Regulo-Controlled New World " oven one obtains complete circulation of the heat throughout the whole of the oven space; uniform and perfect cooking with the oven fully loaded; increased oven capacity; reduced gas consumption; and elimination of all danger of smothering or accidental extinction of the burner flames from any cause. There are enamelled embossed shelf rests, enabling the inside to be easily cleaned.

" *Rado* " *Porcelain Enamel Finish.*—The new and popular



A CORNER OF THE RADIATION DISPLAY.

A "New World" Cooker.



A Radiation "Injector-Ventilator" Fire.

Radiation "Rado" porcelain enamel finish is a process of their own—the result of much research and experiment before success was attained. Several examples of this new porcelain enamel finish are to be seen on the stand.

The Radiation Standard "Injector-Ventilator" Gas Grate.—The Radiation patent "Injector-Ventilator" device is the main feature of the gas grates manufactured by all the Radiation firms. It consists essentially of a specially designed canopy, in which are two openings. The virtue of the design is that greatly increased ventilation is achieved; several complete changes of the air of the room occurring per hour, and entirely without the draughts associated with the coal fire. Many other features to be found in Radiation gas grates have been responsible for a greatly increased demand.

A. RAYBOULD, LTD., and HERBERT JONES & SON,

Birmingham.

(Stand No. 6; Block D. 13.)

There is here a display of excellent fittings and burners, including many new designs of the "Gas Company" fittings. A speciality is the "Auto" burner, which was first shown at the National Gas Exhibition in 1923, and which has proved so successful for automatic installations and maintenance schemes that 250,000 have been supplied to gas undertakings alone. A more recent invention—the "Discus" diffuser—is exhibited for the first time. The object of the diffuser is to prevent the discoloration of fittings and ceilings, and so remove any cause of complaint on this score.

There is also the "Daptaring," which has been designed for use with clustre burners, in order that larger sizes of globes may be fitted to the ordinary universal burner; the idea being to do away with liability to breakage.

JOSEPH T. ROBIN, LTD.,

Greyhound Lane, Streatham, London, S.W.16.

(Block No. H. 13.)

The firm are displaying a full range of gas mantles, both for high and low pressure lighting. This includes their proprietary brands and also other brands which they specially manufacture for their customers. They are also exhibiting the "Durameter" testing apparatus for mantles, and are taking part in the joint working exhibit of British gas mantle manufacturers.

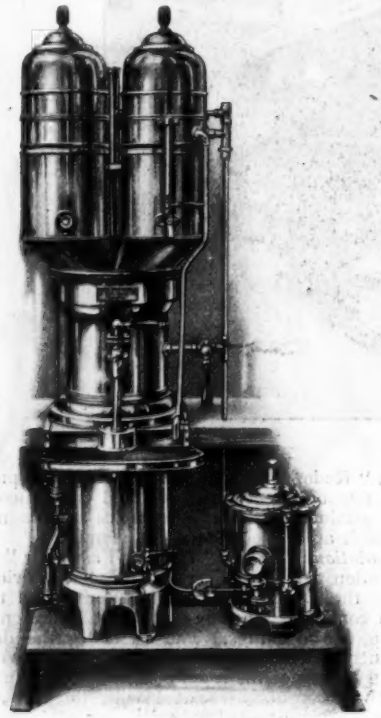
MESSRS. JAMES STOTT & CO., LTD.,

Vernon Works, Oldham.

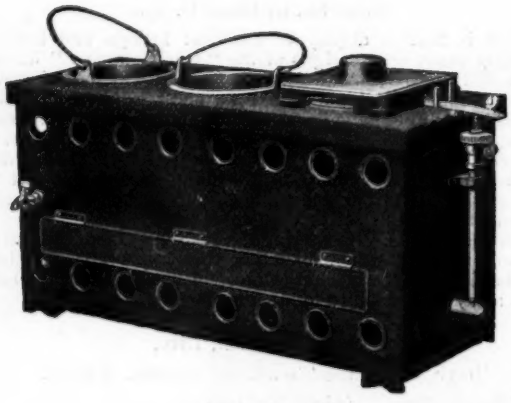
(Block No. G. 13.)

The effect of the Stott gas governor, which is shown here (and over half-a-million of which are in use), is entirely to prevent variation in the supply pressure, and to maintain a mean pressure at the point at which highest efficiency is obtained. The proper working of every Stott governor is guaranteed for ten years. With the Stott patent self-feeding water boiler, boiling water is obtainable within three minutes from a cold start, and afterwards instantaneously. There is nothing but freshly boiled water whenever the draw-off tap is opened. The gas is only full on when water is actually being drawn, so that the appliance is economical in gas consumption; and it has a very high efficiency. A unique water boiler speci-

ally suitable for the smaller cafés and hotels is the Stott patent "Regula," which can be constructed to give boiling water only, or hot or boiling water as desired. All examples are fitted with the firm's automatic control, whereby the gas is reduced to a by-pass immediately the water is boiling. The boilers are automatically fed with water.



Service Room Set.



Glue Cabinet.

The Stott patent under-counter service room set comprises water boiler, automatic coffee-making machine, and self-regulating milk and coffee urns. All embody the principles of automatic gas control, to ensure the utmost economy. Tea may be brewed within three minutes from lighting the gas, and coffee infused within ten minutes. Water for tea making can never be over-drawn, no matter how long the draw-off tap may be open. Water is always at boiling-point. Coffee cannot be infused except with boiling water under pressure; the coffee machine automatically turning on the water for infusion, and automatically turning it off after infusion has taken place. The milk and coffee urns are maintained at uniform temperature just below boiling-point at all times; and it is impossible for either liquid to be over-heated or for more gas to be consumed than is necessary to obtain the desired result.

The automatic control is a great feature of the Stott patent self-regulating glue and adhesive cabinets. This control is effected by a float immersed in water operating the gas valve. A great saving in gas, glue, and workmen's time is effected. The glue is always of the same consistency. No attention is required after once lighting the gas. Another apparatus the heating medium of which is automatically controlled is the Stott patent self-regulating vegetable steamer.

STOURBRIDGE REFRACTORIES COMPANY, LTD.,

Shut End Works, Pensnett, near Dudley.

(Stand No. 4; Block G. 13.)

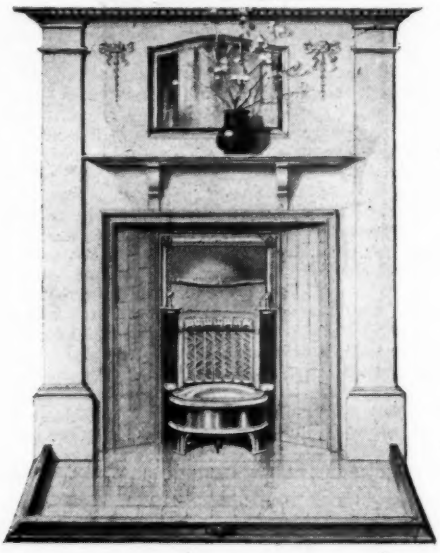
There are here samples of special blocks as used in the building of retort settings, generator blocks, water gas blocks, refractory insulating blocks, jointing cement for silica work and fireclay work, and hot patching cement.

WILLIAM SUGG & CO., LTD.,

Ranelagh Works, Chapter Street, London, S.W. 1.

(Block No. D. 13.)

This comprehensive exhibit embraces appliances which use gas to the best advantage for lighting, cooking, and heating, and includes many novelties. Overseas buyers will be particularly interested in the lamps and conversion fittings for public lighting which are giving excellent service in all parts of the world. Specimens are exhibited of the lamps used abroad, as well as throughout Great Britain and Ireland—including the "Littleton" lamp (upright and suspension), the newer "Promenade" lamp, the "Grosvenor" (with bent glass panes), and the "Windsor" square street lamp. All of these employ superheated clusters of small mantles—the principle which has proved to give greatest efficiency on lowest consumption. There are various examples of means to control the lamps, including Sugg's patent distant-control device, which functions without separate service pipes to the by-pass, and also clock controllers. An interesting novelty to be seen on an eight-light "Rochester" suspension lamp is a stainless steel reflecting shade, the advantages of which are obvious. This lamp, by the way, is fitted with dual control which permits two, six, or all eight of the mantles to be in use—allowing a lower standard of lighting to be adopted after midnight, when there is less traffic on the streets.



"Red Knight" Inset Conversion Fire in Existing Grate.

Ventilating Ceiling Light.

The lighting portion of the exhibit embraces a number of attractive fittings for indoor use, among which are the "Bon

Marché " lamp (with ceiling reflector and widely diffused outlet), and the ventilating ceiling light providing efficient illumination combined with excellent ventilation. The " Flambeau " brackets are neat wall fittings. A novelty in connection with all these indoor fittings is the tumbler switch control cock for use in conjunction with distant-control devices, and which renders the control of gas not only as easy and convenient as of electric light, but also as neat. A further novelty is the " Intermediate " valve, with a new type of switch for operating the distant-control device in another way.

The section devoted to cooking appliances includes specimens of all seven models comprised in the " Chef " series. These are attractive, whether in bright green, black and silver, or tile enamel. The construction makes for efficiency, economy, and ease of cleaning. The " C.B." cooker is suitable for flats and small households, and at the other end of the scale are large kitcheners, one of which is shown with a partial " Sugg-Larkin " patent hotplate. In addition to the various standard models of cookers, boilers, &c., Messrs. Sugg specialize in the design and construction of large cooking apparatus of all kinds for hotels, hospitals, and institutions; and a few examples of this type of work are displayed. In connection with these cooking appliances, mention should be made of the " N.S.C." governor—a neat device which is designed for fitting in some convenient position, as for instance, on the float-rail of a cooker. The object is to ensure uniform pressure of gas at all times, and thereby promote economy. A " Chef " cooker is exhibited with a divided float-rail; one side being open to the ordinary gas pressure, and the other governed by the " N.S.C."

With regard to heating, a complete range of the firm's " Red Knight " gas fires is exhibited. The special features of these fires are the incurved fuel formation; the central control tap in the front, which permits the fitting of the service from either side; and the patent atomizer, which ensures silence when lighting, burning, or extinguishing. These fires are supplied in three forms—the first a conversion type intended to replace entirely the coal grate in an existing fireplace; the second, a complete interior fire intended for the modern type of flat fireplace; and the third, the independent type complete with flue outlet for use in any suitable position. The " N.S.C." governor referred to in connection with the cookers is also made in a smaller form suitable for use with these or any other gas fires.

A. G. SUTHERLAND, LTD.

Warwick Road, Greet, Birmingham.

(Block No. D. 13.)

Various types of dry gas meters—ordinary, prepayment, gas fire, and high capacity—are displayed on this stand. The Company's prepayment attachment is designed with a view to simplicity, combined with accuracy and strength. The range is from 6 to 45 c.ft.; and price-changing is instantly effected. The Warwick gas fire meter is a small type, having a capacity of 30 c.ft. per hour. It is made for 1d., 6d., or 1s., and is supplied with a special key to enable the owner of the meter to close the valve *in situ* at will.

Open meters of various kinds are shown for closer examination; while a glass demonstration meter is to be seen working.

SUTHERLAND METER COMPANY, LTD.,

Birmingham.

(Block No. H. 12.)

The Company are showing: (1) Their standard test meter, suitable for testing consumers' meters *in situ;* (2) the latest high capacity prepayment meter, as supplied to the British Isles and the Colonies; (3) the gas fire prepayment meter, together with neat cabinet for use in hotels, boarding houses, &c.; and (4) meters specially made and supplied to Poland and Spain. The last-named exhibits illustrate the progress that is being made by this firm in capturing foreign markets.

JOHN & JOSEPH TAUNTON, LTD.,

Belgrave Works, Sherbourne Road, Birmingham.

(Block No. D. 13.)

A novelty on this stand is a working model of the "Taunton" gas " Tell Tale "—an accurate recording device, showing gas consumption graphically charted during every minute of the day or night. It may be obtained fitted to all sizes of meters. The clockwork mechanism is designed with an eight-day movement; and charts are provided to show seven days' consumption of gas. The chart is divided into days, hours, and quarter-hours. The rate of gas consumption is shown by a black line. For a No. 4 " Standard " meter, each complete movement of the pen across the chart represents 50 c.ft. When no gas is being consumed, the pen marks a horizontal line on the chart. The device (which embodies Taunton, Rogers, & McIndoe's patent) can be utilized to prove to consumers, in the case of disputed accounts, how and when they burn gas; and it can be fitted to a station meter to record the hourly make, thus rendering unnecessary frequent readings of the index. It will also be found of particular value in the research laboratories of gas undertakings and manufacturers. Again, it will enable the consumer to detect any extravagant or unauthorized use of gas; it will show when gas is turned on or off in any industrial or domestic apparatus; or it will permit proprietors of hotels, boarding houses, and manufacturing premises to examine weekly the amount of gas consumed. The chart cannot be tampered with by any unauthorized person, as it is locked up in a special box.

The firm also show their new high-capacity meter, in the manufacture of which they have aimed at making the meters work slower while passing more gas, thus prolonging the life of the diaphragms by avoiding racing. They have quadrupled the capacity of the " lights " type of meter, and doubled that of the " Standard " type, without increasing the size of the meter.

THOMAS GLOVER & CO., LTD.,

Gothic Works, Angel Road, Edmonton, London, N. 18.

(Stand No. 4; Block G. 12.)

There are standard capacity dry gas meters on this stand which are made to register accurately under the most exacting conditions. The diaphragms are dressed with a special preserving mixture; and the leather is banded-on by flat-surfaced leather-covered metal bands, which ensure even pressure all round, a gas-tight joint, and the absence of sharp edges and puckers. These meters are of both ordinary and prepayment types. With the latter, price changing is as easy as altering the time on a clock. An improved form of the firm's original price changer is fitted. Securely held, it is impossible for the price changer to slip. No sealing wax or screws are required; it is automatically locked by the closing of the cash box. When the coin slot is open, the mechanism cannot be operated. There are also high capacity ordinary and prepayment meters, the mechanism of which is of entirely new design, ensuring low pressure loss, easy working, and accurate registration at the peak load. The firm's high capacity meters are fitted with a new type of non-frictional gear, which has been tested up to 1000 revolutions an hour for long periods without showing any signs of wear or making any noise.

Other specialities of the firm are the " Rapid " automatic coin counter; service cleansers specially for dealing with naphthalene; experimental and test gasholders; and street lanterns and accessories.

Of special interest are the glass-cased models of the meters already alluded to. These provide an opportunity of inspecting the action of the mechanisms and the excellence of their design. Various meter assemblies and parts are shown separately, all of which testify to the strength and finish of the Thomas Glover meters.

TIMMIS & CO.,

River Stour Works, Stourbridge.

(Block No. C. 12.)

A display is made by this firm of refractories suitable for the carbonizing industries. There is a full range of highly refractory fireclay bricks of varying textures and physical properties, of the highly grogged Continental type. This is the first occasion on which " Lava " is being exhibited in the full range; and there is now a texture to suit every furnace for work under the worst conditions.

TUBES LIMITED,

Birmingham.

(Block No. B. 13.)

Here is a display of cold-drawn weldless steel tubes, from ¼ in. to 15 in. bore, including tubing for the motor and cycle trades. There are all types of boiler tubes for marine and land work; steam pipes up to 15 in. bore; and copper-lined tubes for the chemical trade.

F. TURNER,

61-63, Summer Hill Street, Birmingham.

(Stand No. 5; Block D. 13.)

As patentee and manufacturer of the " Adjustable " art-metal surround to fit varying sizes of mantel openings, hearths, kerbs, and complete mantelpieces, Mr. Turner has a display of handsome goods, which are of great use in connection with gas fire installations. The " Adjustable " surround is quite an original idea, being fitted with a frame which is adjustable on the surround itself. This new surround is easily fitted, and will be made in a variety of patterns.

THOMAS VALE & SONS, LTD.,

Stourport.

(Stand No. 4; Block G. 13.)

This exhibit consists of a model of a reinforced concrete bridge just completed at Evesham for the Worcestershire County Council; a full-size standard bar grate for horizontal or vertical retort settings, with the firm's patent self-fitting clinkering door; and samples of broken and round gravel for reinforced concrete work.

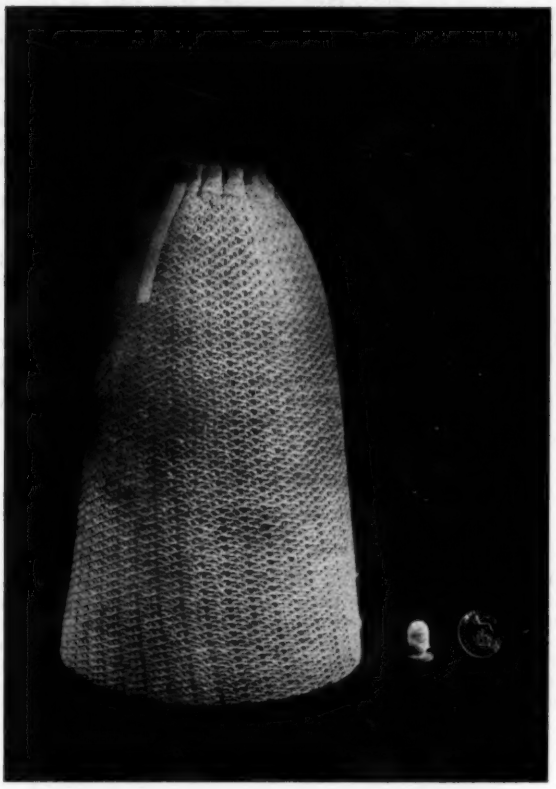
WELSBACH LIGHT COMPANY, LTD.,

Gray's Inn Road, London, W.C. 1.

(Stand No. 3; Block H. 13.)

The chief feature of the exhibit of the Welsbach Light Company is an actual lighthouse burner used in conjunction with a lens panel similar in every respect to those now in existence in the important lighthouses around the British Isles. This has been kindly loaned for the purpose by Messrs. Chance Bros. & Co., Ltd., Lighthouse Works, Birmingham. The mantle in use on this burner is the largest in the world, and measures 9 in. in height. It is identical with those manufactured exclusively by the Welsbach Company for lighthouses, not only for the British Isles, but also for other parts of the world. The burner and mantle, in conjunction with the lens apparatus, give an illuminating power approximating to 78,000 British candles.

Immediately in front of this wonderful lighthouse mantle and burner is seen the smallest gas mantle in the world—also exclusively made by the Welsbach Company. This mantle is known as the "Microscopic Mantle," and is scarcely three-eighths of an inch in height. It is fitted to the "Metro Glow Light" burner, which is manufactured and supplied by the South Metropolitan Gas Company. Its illuminating power is only 2 or 3 candles; and its function is to replace the old-time night-light as used in bedrooms.



The Largest and the Smallest Welsbach Gas Mantle, shown alongside a Sixpenny Piece.

Around these two unique exhibits will be found a tier stand of semi-circular shape on which is displayed a range of over a hundred different mantles of all shapes and sizes. Mantles for every conceivable burner are here on view—upright and inverted—in hard or soft finishes, and knitted or woven in various meshes. Undoubtedly a wonderful display.

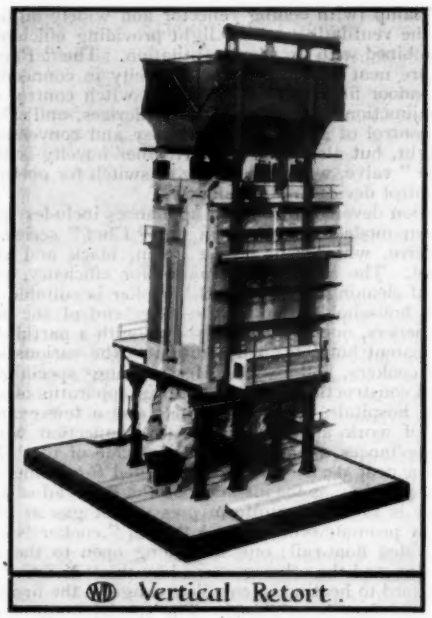
Another exhibit of interest is to be found in two antiquated lanterns fitted up with old flat-flame burners, showing gas illumination before the advent of the incandescent mantles made by the Welsbach Company. There are also to be seen the Welsbach "Handiheater" and a range of Welsbach-Kern radiators in various colours and sizes.

WOODALL-DUCKHAM COMPANIES, Allington House, 136, Victoria Street, London, S.W.1.

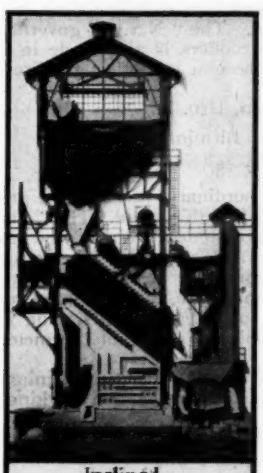
(Block No. G. 13.)

On the stand occupied by the Woodall-Duckham Companies some of the leading types of plant constructed by them are illustrated by means of models. Four types of carbonizing plant designed to meet varying requirements are shown:

1. The "W-D" Continuous Vertical Retort, which gives a high thermal yield per ton of coal and per unit of ground space, combined with a first-class domestic coke and low labour costs.



W-D Vertical Retort.



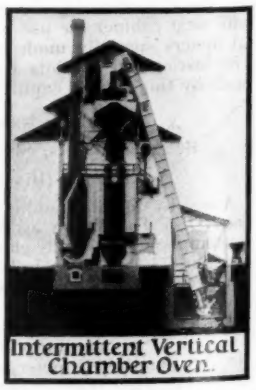
Inclined Chamber Oven.

2.—The "W-D" Intermittent Vertical Chamber, which occupies less ground space than horizontal retorts, and is particularly suitable for carbonizing cheap slacks, producing a dense coke, suitable for domestic purposes when properly screened.

3.—The "W-D" Inclined Chamber, which meets the demand of modern gas-works practice for bulk carbonization, and produces good coke from poorly coking coals.

4.—The Becker Coke Oven, which is the latest development in coke oven construction. This oven gives a high output per oven per day of coke of uniform size and quality, and is applicable not only in the coking industry for the production of metallurgical coke, but also gas-works for the production of coal gas and coke.

The Woodall-Duckham Companies, realizing the demand for an efficient and economical coal drier, acquired, after close investigation, the rights for the British Empire (excluding Canada) and for the Continent of Europe, of the Carpenter continuously working centrifugal drier. Practical experience with a number of machines erected in this country has proved the efficiency of this system. A model of the Carpenter drier is shown. Another model of great interest is that of the "T.I.C." (lead bath) tar treatment plant. The model is complete with stills, condensers, heat interchangers, pitch bays, &c. In the construction of modern carbonizing plant, refractory materials play an important part; and the exhibit includes a number of special shapes of silica and firebrick material used in the building of "W-D" plants. The methods of testing the refractories are also demonstrated in a series of show cases. There are a number of coke sections prepared to illustrate the structure of solid smokeless fuels made in different ways.



Intermittent Vertical Chamber Oven.

To complete the exhibit, there is a series of mounted photographs illustrating plants built by the Woodall-Duckham Companies, which form a picture gallery illustrating the complexity and ramifications of the gas industry.

GEORGE WILSON GAS METERS, LTD., Foleshill Road, Coventry.

(Stand No. 4; Block E.13.)

On this stand is to be seen a selection of gas meters for demonstration purposes, which are fitted with glass cases. Some of the meters are of the high-capacity type—a type which is making rapid progress with many of the gas undertakings in Great Britain to-day. Owing to their small size and large capacity in comparison with the "Standard" and "lights" types of meters, there is a saving of space which is seen from the comparison made on the stand. The exhibit also includes various types of prepayment, stop, test, and ordinary meters.

The important feature of this stand, however, is the display of gas meters fitted with the firm's patent "Certus" oiling and greasing device. The firm claim that this system is infallible, and that it must necessarily be a great advance in the manufacture and efficiency of gas meters, which up to recent years depended for their precision on the lubricating qualities of the gases passing through. Owing to changes in the manufacture of gas, these lubricants have been largely eliminated; and the replacement of oil and grease in the vital parts of the meter mechanism must therefore be considered a great step forward in the construction. The "Certus" system can be actually watched owing to the glass cases; and demonstrations are also given.

MISCELLANEOUS EXHIBITS.

W. & T. AVERY, LTD.,

Soho Foundry, Birmingham.

In connection with this year's Fair, Messrs. Avery have decided to break away from the usual method of exhibiting their goods. To make the exhibit more interesting to foreign buyers, as well as to visitors in general, they have given up their stand to a display of tableaux showing the evolution and history of weighing throughout the ages. The stand represents a temple of which the emblem of weighing—viz., the Arm of Justice holding a pair of scales—is the prominent feature. Six tableaux are visible through plate glass windows; and they show: (1) Weighing in Ancient Egypt, about 2000 B.C.; (2) King Arkesilas II. of Cyrene (580-550 B.C.) superintending the weighing of a cargo of silphium—the asafœtida plant; (3) weighing in Imperial Rome; (4) weighing in England about 800 A.D.; (5) weighing in a French market-place during the fifteenth century; and (6) weighing gold and silver plate in a large London goldsmith's shop about the end of the seventeenth century. One side of the temple is open; and through an archway the visitor enters the major hall, in which are shown a few examples of the latest development in the weighing machine industry. This hall is in a black and white scheme of ultra-modern design. The end portion is taken-up by a proscenium, in which is shown what is regarded as the masterpiece of measuring instruments of the latest design, absolutely fool-proof, and perfectly accurate, measuring to the drop. From this hall one enters a minor hall, which is really a picture gallery, containing an extensive collection of photographic enlargements of Avery products in weighing, counting, and testing machines.

BOWEN INSTRUMENT COMPANY,

9, Newton Road, Leeds.

Among a large variety of instruments, two forms of optical pyrometer particularly suited for gas-works, &c., are demonstrated. The first is the "Wanner-Simplex," which operates on the principle of polarization of light, and in this manner compares the intensity of light rays received from the source of heat with that derived from a small electric lamp fitted internally. Having adjusted the current passing through the latter (by means of a rheostat and ammeter provided), the operator then merely turns the temperature pointer until equal intensities are observed through the eye-piece of the pyrometer. The second is the "Optix," an entirely new instrument constructed in compact form. As in the case of the "Wanner-Simplex," the operator compares the light intensity of the hot body with that of a small electric lamp. These two intensities are, however, brought to equality by absorption. Looking through the eye-piece of the pyrometer, the observer moves the instrument until the field of vision covers the hot body to be tested. A small star of light (lit by the electric lamp) will be observed in the centre of this field. The operator turns a knurled ring until the star completely disappears from view. The correct reading is then indicated on the temperature scale. The slightest deviation from this setting at once throws the star up into view. The instrument may thus be defined as a "Disappearing Star" pyrometer; and the accuracy obtained is one of its strongest features.

BRITISH THOMSON-HOUSTON COMPANY, LTD.,

Rugby.

Electrical plant for industrial use figures most prominently on the stand of the British Thomson-Houston Company; and visitors to the stand may note how in the most recently introduced range of electric motors the Company are able to offer A.C. and D.C. machines of the same ratings, which are identical in all essential dimensions. This feature is of great importance to makers of machines to standard dimensions; and it may be mentioned that the motors in this range are of both horizontal and vertical types and can be supplied to run at any angle—a roller bearing being fitted at the driving end, where the load is greatest, and a ball bearing at the other end. In motors arranged for vertical operation, the skirt base casting is separate from the end-shield casting, so that machine makers can readily fit their own adaptor rings, or easily adapt the motors to pumps, &c.

Another line of motors of wide application is that with fractional horse-power ratings. This line is represented by typical examples from the standard range for fixing in the ordinary manner, and by examples of a modified design, without feet, for special application.

The motor control gear exhibited comprises numerous types for both A.C. and D.C. motors; in all cases the design being such as to ensure ease of installation and maintenance, reliability in use, and safety to the operator. In addition to various detail improvements incorporated in some of the more widely-known "B.T.H." control equipments, new items of switch and motor control gear are exhibited for the first time, one of these of especial interest being an ironclad oil-immersed triple-pole thermal circuit breaker with "on" and "off" push-button control. This type of circuit breaker is primarily intended for use with three-phase induction motors on circuits up to 660 v., and has been designed with the object of providing a cheap and reliable form of protection which will enable the motors to carry heavy overloads for short periods, but will disconnect them on sustained overload as well as on any irregularity developing in connection with either the supply or the motor.

CANDY & CO., LTD.,

Heathfield Station, Newton Abbot.

In addition to showing their "Devon" fireplaces, the firm have arranged a suite with a gas fire fitment which is quite a new feature with them. For this fitment, there is a slabbed bullnose and tile surround, finished with bullnose at sides, returning to the wall line, thus doing away with the necessity for an expensive wood chimney piece. To this is fitted an up-to-date faience surround, into which is built a gas fire made in one piece, and therefore so simple as to render it easy to instal. The fitment can be supplied in a number of highly finished and special antique glazed effects.

CARRON COMPANY,

Carron, Stirlingshire.

The firm make a comprehensive display of their varied manufactures. There are appliances for cooking and heating by gas and other agents; and larger engineering products are also represented, while the ironwork surrounding the stand is of Carron manufacture.

EDWIN CHAMBERS, LTD.,

Onward Works, Leeds Road, Bradford.

The "Onward" is a gas oven of the portable type, for which is claimed a quick cooking action, because of a packing of insulated material that retains the heat.

DAVEY, PAXMAN, & CO., LTD.,

Colchester.

There are being exhibited by this firm two vertical crude oil engines, the smaller size being of 25/29 B.H.P., single cylinder, and the larger of 360/420 B.H.P., six cylinders. Both engines are built on the well-known Paxman principle of unit cylinders and ventilated crankcases. The injection of the fuel is on the "Spring Injection" system; and the design of both engines embodies the Paxman-Lentz type of valve gear. The general arrangement of the fuel-measuring pumps and governor gear on the large engine is extremely interesting, and presents a very straightforward and simple assembly. Both engines are stopped and started, to demonstrate the simplicity of this operation; and attention is drawn to the fact that the engines are shown running under their own power on their ordinary fuel. The extreme evenness of the distribution of the fuel to all cylinders of the large engine serves to demonstrate the benefits to be obtained by having independent fuel pumps to every cylinder—particularly when these fuel pumps and their

pipelines are free from any pressure, as is the case with the "Spring Injection" system. The smooth running of the Paxman engine is particularly noticeable, and is due to the combined facts of very careful balancing and machining, the "Spring Injection" fuel system, and the patented valve gear.

EXPANDED METAL COMPANY, LTD.,

York Mansions, Petty France, Westminster, S.W. 1.

The Company specialize in all forms of reinforced concrete work. Their "Servarising" treatment of metal articles to protect them from oxidization at high temperatures is suitable for heat treatment appliances, oil engine parts, furnace fittings, oil burner nozzles, tools for roasting furnaces, preheater tubes, &c. Specimens of treated and untreated samples of mild steel, from the same bar, heated together under oxidizing conditions at 950° to 1050° C., show the efficacy of "Servarising."

FALKIRK IRON COMPANY, LTD.,

Falkirk.

The principal exhibits of the firm consist of fireplace suites in rustless steel, antique bronze, and copper; a display of fireplaces in various finishes, living-room grates, and combination stoves; "Smoothtop" gas cookers; and the new "Pixie" gas cooker. "Red Knight" fires, independent and fitted to interior fireplaces, mantel grates and other lines for housing are shown.

FRASER & CHALMERS ENGINEERING WORKS,

Erith.

The exhibit of the Fraser & Chalmers Engineering Works at Erith portrays examples of a few representative lines which are very much to the fore in the engineering world to-day. No branch of engineering comes more within this category, perhaps, than that of pulverized fuel; and in this direction the firm are showing a model of a plant consisting of an "F. & C." impact pulverizer connected to a Lancashire boiler. The pulverizer is one of the makers' latest designs, and embraces new and interesting features, among which are: (1) The ease of control of the pulverized fuel; (2) low power consumption; (3) efficient pulverization; and (4) compactness of design. The body of the pulverizer is made in halves, thereby ensuring easy inspection; and the separating chamber is of a design conducing to pulverization remaining constant. The burner itself (of the "Virtex" type) has been specially developed in relation to Lancashire boilers, and is the result of many years' experiment and research. This burner makes for most efficient operating, and ensures complete combustion within a few feet of the boiler front. The Lancashire boiler is shown in section only, although a graphic idea of the combustion of the fuel is obtainable from an electrically illuminated sign which is installed on the stand.

HAILWOOD & ACKROYD, LTD.,

Beacon Works, Morley, near Leeds.

There is on the stand of this firm an excellent display of illuminating glassware, in clear, opal, and satin finish.

IMPERIAL CHEMICAL INDUSTRIES, LTD.

A number of exhibits are made by this group of Companies. One of these is Crawshaw's "Chemical Colander." This is a development which enables engineers and others to remove grease from metal parts in a practical, efficient, and economical manner, with the aid of a chemical.

INTERNAL COMBUSTION, LTD.

Africa House, Kingsway, London, W.C. 2.

Various component parts of the "Lopulco" pulverized fuel plant are exhibited. Among these is a specially designed fuel feeder which has been brought out since the last Fair. There is also the "R" burner, which, by reducing greatly the flame length, has made it possible to instal a smaller combustion chamber than hitherto. This in itself has altered very considerably the whole design of the "Lopulco" system.

An associate company—Coal Oil Extraction, Ltd.—show specimens of oil, &c., taken from their carbonization process.

MELDRUM BROS.,

Timperley, near Manchester.

There is shown at this stand a dummy front of a Lancashire boiler, to which is fitted in one flue a Meldrum automatic "Sprinkler" type stoker mechanism. Other specialities include smoke prevention doors; patent interlocking firebars for utilizing fine fuels; and centrifugal pumps, cocks, valves, and steam jet apparatus in Meldrum acid-resisting and other metals. There is exhibited the smallest of a range of steel cased refuse destructors to consume from 25 lbs. to over 2 tons of refuse per hour.

G. B. PARKES, LTD.,

Crown Works, Halesowen.

This firm have long realized the importance of putting on the market a fitting which can be guaranteed leak-proof under any conditions of service. While the hydraulic test usually employed gives a fitting which is leak-proof to a certain degree, they regard it as not good enough for the severe conditions met with in some industries. They have therefore recently developed a patent pneumatic testing plant which enables them to fill each individual fitting with air at 100 lbs. pressure, and in this condition immerse it in water, in order to detect any leaks. This testing plant is to be seen under actual working conditions.

The dependence which may be placed upon fittings which have successfully passed the pneumatic test, will be gathered from the statement that the test is considered to be eight times as severe as the ordinary hydraulic test.

PULSOMETER ENGINEERING COMPANY, LTD.,

Nine Elms Iron Works, Reading.

The firm exhibit centrifugal pumps for all purposes, turbine pumps, and vacuum pumps. There is also a circular "Torrent" filter, for any purpose requiring continuous filtration.

REAVELL & CO., LTD.,

Ranelagh Works, Ipswich.

The firm are showing a selection of air compressors, including a vertical double-acting compressor, a quadruplex compressor, two vertical single-acting compressors, a rotary compressor for low pressures, &c.

There can also be inspected the "Reavell-Askania" regulator, one of the applications of which is in the gas and allied industries. The regulator operates on the well-known jet-pipe principle, which forms the basis of its application to all regulator problems. It is stated that it will maintain the pressure at retorts constant to within 1-50th to 1-100th of an inch water gauge, according to the pressure range required. It is supplied adjustable for any desired range, either below or above atmospheric pressure, and also as a combined pressure and suction regulator, adjustable between positive and negative pressure limits, and which will maintain level-gauge pressure if desired. Apart from its unusual sensitiveness, the "Reavell-Askania" regulator has the further advantage, when controlling coal and coke oven gas, that it has ample power to operate heavy butterfly valves in mains where considerable quantities of tar are present; and unless the regulator is out of operation for long periods and the tar allowed to accumulate and harden, no trouble whatever is experienced in this respect. "Reavell-Askania" regulators are usually arranged to control the pressure at the retorts or ovens by throttling the draw produced by the exhauster, so that a constant pressure is maintained in the collecting or foul main—*i.e.*, on the retort side of the regulating valve, which is usually of the butterfly type. There are many other uses for this system.

STEWARTS & LLOYDS, LTD.,

41, Oswald Street, Glasgow.

Steel mains of all diameters for gas, water, &c., are supplied by this firm, who have, from the time (some forty years ago) when the use of steel tubes as gas and water mains was regarded as an experiment only justified by exceptional circumstances, right down to the present day, when it is recognized as normal practice, been pioneers in introducing improvements in manufacture, jointing, and coating which have brought steel tubes to their existing state of perfection. They supply them with spigot and socket joints for lead and yarn, loose flange joints, joints for welding into continuous mains, "Victaulic" joints, or with any other type of joint that may be specified.

The firm have installed plant for lining tubes centrifugally with concrete or with their special bituminous composition. Steel tubes lined with concrete have, they say, all the advantages of reinforced concrete pipes. Steel tubes lined with bituminous composition are a later introduction. The bitumen is combined with a porous absorbent, so as to produce a homogeneous mixture, which, when applied centrifugally, presents a smooth glossy surface, offering minimum frictional resistance to the flow of water in the main. This lining will not soften or creep when exposed to temperatures under 180° Fahr. A special spigot-and-socket joint has been designed for tubes lined with this composition, which ensures that the lining will be continuous, without any gaps occurring at the joints. Steel tubes coated outside with their special bituminous solution, wrapped with bituminized hessian cloth, and lined by either of the above methods, are claimed to be superior to pipes made of any other material. They have the great advantage of being unbreakable.

TANGYES, LTD.,

Cornwall Works, Birmingham.

There are here a number of examples of "Tan-Gyro" centrifugal pumps, which are in very extensive use. The firm also manufacture gas engines and suction gas producers; and there is on the stand in actual operation a heavy fuel oil engine (cold starting) of 52 B.H.P.

THERMAL SYNDICATE, LTD.,

Wallsend-on-Tyne.

Many applications, including gas globes, are shown of transparent "Vitreosil," which is made from very high quality rock crystal, specially hand picked and purified.

TILLEY HIGH-PRESSURE GAS SYNDICATE,

Brent Works, Hendon, London, N.W.

There is shown here a gas tinmen's stove for a single iron (for use with gas at ordinary pressure), introduced to meet the demand for a compact, practical tinmen's stove which is easily fixed and consumes the minimum amount of gas. The stove is made of cast iron and lined with a firebrick of special design, which conserves the heat generated and reduces radiation losses to next to nothing. The burner is so arranged that it cannot become choked by falling dross, and, being made of cast iron, will last indefinitely. The stove consumes a very small amount of gas (about 6½ c.ft. per hour); but this is quite sufficient to heat an iron ready for soldering in three minutes. The stove can be taken to pieces in a moment for cleaning purposes.

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to the Windsor Street Works of the Birmingham Gas Department.

Members of the Midland Junior Gas Association to the number of 60 paid a visit, by permission of the Birmingham Gas Committee, to the Windsor Street Gas-Works on Feb. 11. They inspected the coal gas plant, which consists entirely of Woodall-Duckham vertical retorts (the oldest section having been at work since 1912), the water gas plant, and the meter shops. The party was conducted over the works by Mr. G. C. Pearson, the Engineer, who, with his assistants, explained the chief features of interest; and with them was Mr. H. R. Hems (of the Industrial Heating Section of the Birmingham Gas Department), the President of the Association.

CARBONIZING PLANT.

The retort house was originally designed to contain horizontal retorts of 8 million c.ft. of gas per day capacity. The modern vertical retorts now installed, and occupying two-thirds of the house, produce 20 million c.ft. of gas per day. The carbonizing plant consists of six rows of Woodall-Duckham continuous verticals. The retorts in five rows are each of 5 tons capacity per day, and the retorts of the sixth row each of 7 tons capacity per day. The total number of retorts is 252. Heating is carried out by one furnace to each four retorts, except in the case of the 7-ton retorts, where end producers are arranged. The whole of the ashes from the producers are delivered to a "Columbus" washer, and the separated unburnt coke is taken back to the producers for re-use. The waste heat from the settings is utilized for the generation of steam, and is carried to six Babcock & Wilcox water-tube boilers working at a pressure of 135 lbs. per sq. in. Over 40,000 lbs. of steam per hour is thus raised when the whole plant is at work. The steam is partly utilized for admission to the retorts.

The coal handling plant consists of one electrically-driven rotary tippler and two hydraulic end-tipping rams. The coal is emptied from the wagons by either of the above methods into receiving hoppers, and thence *via* a mechanical constant feed to two 100-tons per hour coal breakers. The coal runs from the breakers into two 100-tons per hour gravity-bucket conveyors running the length of the house, which in turn feed gravity-bucket elevators encircling the retort benches. From these elevators the coal is again transmitted to tipping-tray conveyors feeding at any point the coal storage hoppers over each row of retorts. The total length of conveyors on the works is about ¾ mile, and the total power required for driving the coaling plant is 330 H.P.

COKE PLANT.

The coke is removed from the retorts to the yard by means of twelve 3-ton capacity coke skips conveyed upon twelve electrically-driven chassis running transversely across the house, each under a line of retorts. The quenched coke is automatically discharged from water-sealed doors at the bottom of the retorts directly into these skips, which, when full, travel to the outside of the house. The skips are then raised from the chassis by either of two electric overhead travelling cranes, hoisted a distance of 55 ft., and automatically discharged into overhead ferro-concrete coke hoppers feeding the coke-screening plant, or to stock in the yard, as required. The cranes are of 10 tons capacity, 74 ft. span, and travel longitudinally on a ferro-concrete gantry 60 ft. high. They are designed to hoist, travel longitudinally, and cross-traverse simultaneously. A 30 cwt. electric coke grab, which is easily and quickly attached to the bridle of the cranes and controlled from the cab, is employed for picking up coke from stock. The main crane track has a total length of 458 ft.

The coke is screened into the following sizes:

Large coke	over 2 in.
Small coke	„ 1¼ in. through 2 in.
1-in. breeze	„ ¾ in. „ 1¼ in.
Bean breeze	„ 7/16 in. „ ¾ in.
Dust	remainder.

The coke from the concrete receiving hoppers is delivered to rotary screens by a pusher sure feed. The screening plant is in two sections, one arranged to serve the bag trade, the other to deal with coke sales loose into carts, lorries, boats, or railway trucks. Two screens feed into either of these sections. The large coke is loaded direct into railway trucks on the gantry, or diverted into a hopper under each screen for bagging or loose sales. The small sizes below 2 in. from the two screens serving the bag trade section are taken mixed on a conveyor belt into a 300-ton receiving hopper. During yard hours the coke is removed from this hopper by a band conveyor and fed into two sizing screens that separate the various small sizes and deliver each into bags. The coke under 2 in. from the remaining two screens is sized direct on to belts that deliver into separate hoppers for each size ready for loading carts, boats, or trucks. The final delivery of coke into waiting vehicles is over a small screen designed to remove smalls made during storage. The hoppers are of reinforced concrete construction, and have a total capacity of 600 tons. Breeze is washed for blacksmiths' and special work in a "Coulson" washer, arranged at the end of these hoppers. Storage hoppers feeding ½ cwt. hopper weighing machines are arranged at each works gate to deal with the demand for loose ½ cwt. of coke for household use. Large quantities of coke are sold in this manner, as many as 4694 customers having been served in one day.

VOTE OF THANKS.

At the conclusion of the inspection, Mr. HEMS moved a vote of thanks to the Gas Committee and Mr. Pearson and to the members of his staff. They had been much interested, he said, in noting the many alterations and improvements that had been made at the works in recent years.

The resolution was seconded by Mr. MCNAUGHTON, who commented upon the high standard of efficiency of the coke screening plant.

The vote of thanks was carried with enthusiasm, and Mr. PEARSON, in acknowledgment, said it was a real pleasure to receive the Juniors. It was not suggested, he remarked, that verticals could produce more therms than any other system—as a matter of fact it had been proved that a combination of verticals and horizontals was better—or that verticals made cheaper gas, as modern horizontals were probably cheaper. However, he maintained that verticals were a sound proposition at the Windsor Street Works, in view of their coke market. It was a big problem, where so much gas was needed, to get a sale for the coke; and it was found that vertical coke satisfied the local market. They had a declared value of 475 B.Th.U., and had no trouble with distribution. With horizontals they would perhaps have had a declared value somewhat higher.

Tea followed in the staff mess room, at the invitation of the Birmingham Gas Committee.

Weekly Coal Output.

During the first week in January, naturally the output of coal was somewhat on the low side, but the production since has been well maintained with a slight advance in the number of men employed. During the week ended Jan. 7, 4,420,800 tons were raised; the number of workers being 967,400. In the week ended Jan. 14, the production was 5,278,700, with 969,500 workers. The week ended Jan. 21 registered a production of 5,205,800 tons, with 970,900 workers. For the week ended Jan. 28 the figures were 5,141,900 tons, and 971,500 workers.

Electricity Failures.

A breakdown of the electricity supply at Skipton, on Feb. 16, extended from 4 a.m. until well into the afternoon. Eventually the fault was found in a fuse in a dividing box, outside the town, where overhead and underground cables are connected. Some firms depending on electricity for power had their machinery at a standstill, while others were much delayed before they could get alternative power into operation. At Sowerby Bridge, last week, an hour's breakdown of electricity supply in the evening left many shops in darkness.

AN EXAMINATION OF THE INFLUENCE OF VARIOUS FACTORS ON THE PRODUCTS OF THE CARBONIZATION OF COAL.

[Abstract of a Paper by H. H. THOMAS, B.Sc., of the Liverpool Gas Company, at a Joint Meeting of the Liverpool, Manchester, and Fuel Sections of the Society of Chemical Industry, on Feb. 17.]

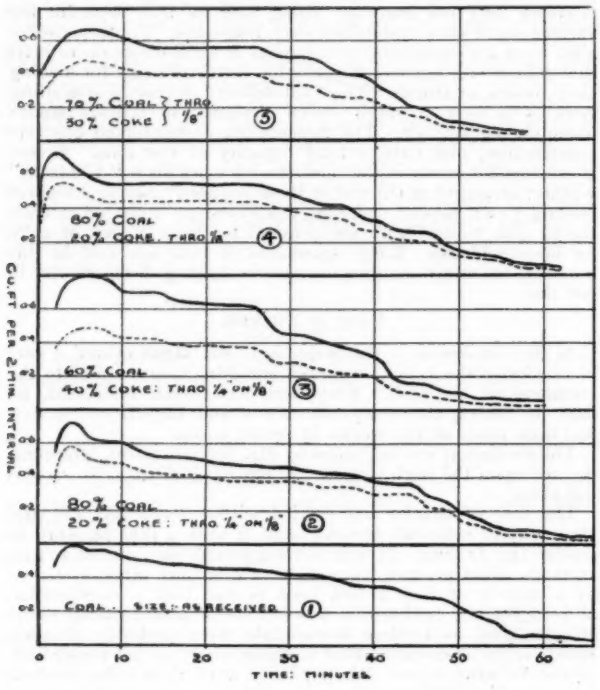
When the gas undertakings of this country become the recognized suppliers of a solid fuel which is suitable for domestic use in open grates, the increase in the demand for coke—the most important bye-product—will help to consolidate the position of the industry in meeting the competition from electricity. A large increase in the use of such a smokeless solid fuel will also assist in the reduction of the smoke nuisance in the large towns.

Low-temperature carbonization is not a process which can be adopted by the gas industry for the manufacture of solid fuel at present, for various reasons. The method which may be used, with modern gas-works plant, is that of blending the gas coal with coke or non-coking coal before carbonization.

This modification of the process of gas manufacture must not cause any serious reduction in the output of the plant, as the main concern of the gas engineer will still be the maintenance of the gas supply.

We shall require to know the effect which the proposed alterations in the method of working will have on the products. The factors which govern the gaseous therm output of the plant are (1) the gas-making value of the coal, and (2) the rate of carbonization.

The gas-making value of a coal is a property which cannot be altered except within very narrow limits; but the addition of an inert material, such as coke, or of a low-grade non-coking coal, will reduce the gaseous therm yield of the charge. This reduced therm yield will necessitate an increase in the rate of carbonization to maintain the output of the plant.



The factors which influence the rate of carbonization are (1) the constitution of the coal, (2) added inert material, (3) size of particles of the coal charged, and (4) the temperature of the retort.

The influence of these various factors has been determined by carbonizing small charges in a $\frac{1}{1000}$-ton laboratory test plant. A reduction in the temperature of carbonization gave a decreased volume of gas of higher calorific value; the net result being a decrease in the gaseous therm yield, from 78·7 therms per ton at 1050° C. to 72·1 therms at 950° C. The coke increased from 13·5 cwt. per ton at 1050° C. to 13·7 cwt. at 950° C., and the dehydrated tar from 11·7 galls. per ton to 14·9 galls. These figures show the effect on the gas (volume and calorific value), coke, and tar, of the increase in the secondary decomposition of the tar vapours at the higher temperature.

The effect of the size of coal charged will be of considerable importance. Efficient mixing of the coals forming the blend will only be obtained when the particles are broken to pass ¼-in. mesh; and further grinding may be necessary in certain circumstances. The reduction in size causes a small increase in the thermal yield, which again is due to the secondary decomposition of the tar vapours resulting in an increase in the volume of gas and a reduction in the calorific value.

The rate of carbonization was determined by observation of the rate of gas evolution during the distillation. The rate was increased by a rise in temperature, and was considerably reduced by the reduction in size of particle. This effect of the size of coal on the rate of carbonization has been observed by Weyman, who concluded that the large sizes gave a less continuous plastic layer than the small coal, and, therefore, a greater rate of heat penetration.

The addition of inert material (coke) gave an increased yield of gas (calculated per ton of coal in the charge) of reduced calorific value. The thermal yield was the same as that obtained with the coal carbonized alone. The yield per ton of charge was reduced in proportion to the amount of coke added. The rate of carbonization was increased by one-sixth in this experiment; and as the coke added was 20 p.ct., it seems very probable that the lower gaseous therm yield of the charge will be balanced by the reduction in the time necessary for its carbonization.

The curves show the effect of changes in the size of particle and the proportion of inert material on the rate of gas evolution from a strongly coking washed slack.

Curve (1): The rate plotted for the coal carbonized alone. Curve (2): The rate of gas evolution with 80 p.ct. slack with 20 p.ct. coke, broken to pass ¼-in. mesh and remain on ⅛-in. mesh. The dotted curve is the actual volume of gas evolved, and the full line shows the rate for a similar charge containing 2·24 lbs. of coal. Curve (3): This indicates the effect of the rapid rate of heat penetration by the large volume of gas evolved in the first half of the period of distillation. More intimate mixing is obtained by further reducing the size of the coke, with the result shown in curve (4), in which the added coke was broken to pass ⅛-in. mesh. This is a greater rate than curve (2), where the same proportion of coke of larger size was added. Decreasing the size of the coal (curve (5)) reduces the rate of carbonization. The smaller sizes of particles (both coal and coke) give improved strength and structure in the residual coke.

A blend of the slack with 30 p.ct. of non-coking coal gave a gaseous therm yield which was equal to the sum of the yields from the two coals when carbonized separately. The rate of carbonization was not greatly increased by the addition of this particular non-coking coal. In this case, the output of the plant may be maintained by removing the charge from the retort before the evolution of gas ceases. Heating beyond a certain point gives only a small volume of low-grade gas. The improvement in the coke which would be obtained when this gas remained in the coke would more than compensate for the small reduction in the gaseous therm yield.

The addition of coke to the coal gave a coke which was slightly more reactive to CO_2 than the pure coal coke. With 30 p.ct. of non-coking coal the reactivity of the resultant coke was more than twice that of the pure coal coke.

Thus, by the selection of suitable coals, proportions of mixing, and conditions of carbonization, a considerable improvement in the reactivity and structure of the residual coke is obtained. This fact, combined with control of the ash and moisture contents of the coke, will result in the production of a smokeless solid fuel which will burn freely in an open grate.

The subject of this paper was suggested by experimental work carried out in the laboratories of the Liverpool Gas Company; and my thanks are due to Mr. R. E. Gibson, Chief Engineer, for his permission to use the results.

Institution of Chemical Engineers.—The annual meeting of the Institution will be held on Thursday and Friday, March 8 and 9, at the New Princes' Restaurant, London. At noon on Friday the President (Sir Alexander Gibb, G.B.E., C.B.) will address the meeting on "The Economics of Power as Applied to Chemical Engineering." The annual dinner of the Institution is fixed for the evening of the same day.

The Bunsen Burner.—Almost simultaneously with the introduction of the bunsen burner, a burner on the same principle was discovered independently by Elsner. Prof. Bilts, of Breslau, has lately pointed out that the method of obtaining a non-smoky flame by the introduction of air was also known to Faraday, who designed an adjustable burner on this basis. A model of this is being shown in the Deutsche Museum at Munich.—"Chemistry and Industry."

MIDLAND JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held in the Council House, Birmingham, on Feb. 16—Mr. H. R. HEMS presiding.

The PRESIDENT, introducing the lecturer, Mr. J. W. Wood, M.Sc., of Leeds University, pointed out that they looked upon him as a Birmingham man, for he was engaged in scientific research work in the city for some years. Mr. Wood was at present working for the Joint Committee of the Institution of Gas Engineers and the University of Leeds.

Mr. WOOD prefaced his lecture by saying that when it became known that he was to give a paper in Birmingham, it was suggested that he should convey a message of goodwill from the Yorkshire Junior Association, of which he was a member, to the Midland Juniors. Mr. Chester, President of the former Association, desired to be associated with the message.

AERATION.

By JAMES W. WOOD, M.Sc., A.I.C., The University, Leeds.

I should like to preface my paper with two remarks. The Midland Junior Gas Association recruits its members from the younger men of the industry, in the belief that mixing with the older "Juniors" facilitates their technical and professional advancement. Your Secretary's invitation to read a paper before the Association was therefore accompanied by a request that it should be suitable for students; and this request has materially influenced my treatment of the subject which was chosen for this evening's paper. In December, 1926, I presented a paper on "Aeration" to the Yorkshire Junior Gas Association, but owing to serious family illness the manuscript was never finished for Press, and consequently does not appear in the Transactions of the Junior Gas Associations. The Yorkshire Junior Gas Association have kindly allowed me to present the same subject-matter to you this evening, though the paper has been entirely re-cast, and I have had the benefit of the very practical discussion which followed my Yorkshire paper.

Some nineteen years ago a Joint Committee of the Institution of Gas Engineers and the University of Leeds commenced a programme of research work in relation to gas appliances. Dr. E. W. Smith was the Research Chemist, and his name will be associated with the development of a means of measuring the radiant efficiency of gas fires, pointing out the advantages of the then new tubular radiants which brought the radiant efficiency of gas fires from 20 to 25 p.ct. up to practically 50 p.ct. of the thermal value of the gas. When Dr. Smith left Leeds to take up duties with the City of Birmingham Gas Department, his work was continued by Mr. Harrison, chiefly in connection with the ventilating properties of gas appliances.

The war intervened, and the activities of the Committee were suspended for a time; but rather more than ten years ago the Committee was re-constituted, and as its Research Chemist I took in hand the investigation of the relative efficiency in use of different grades of gas, mainly in domestic appliances, special attention being directed to the matter of "inerts." The investigation disclosed that, within surprisingly wide limits of C.V. and inerts, the thermal efficiency in use was practically constant, provided the same rate of B.Th.U. supply was maintained.

For stabilizing burner adjustments, however, it was desirable that the same C.V., attained by gas of approximately constant composition and specific gravity, should be supplied in any one district. This condition so far as C.V. is concerned is now covered by the Gas Regulation Act of 1920, but exact control of the other properties would be accompanied by expense out of all proportion to the subsequent advantage to the consumer. While those investigations were in progress, it was found that the successful application of the different grades of gas in existing appliances was intimately associated with the matter of aeration; and an investigation of this followed in due course.

COMBUSTION.

You are all aware that gases require for their complete combustion a certain minimum amount of oxygen or air, designated the "theoretical air requirement." Per c.ft. of combustible this is very variable, and ranges from 2½ c.ft for hydrogen and carbon monoxide, to 10 c.ft. for methane; while the unsaturated hydrocarbons need 15 c.ft. for ethylene, and about 40 c.ft. for benzene vapour. Thus, despite the small proportion in which they are found in town gas to-day, they may account for no mean fraction of the total air requirement.

By far the greater amount of town gas supplied to-day ranges from 450 to 500 B.Th.U. per c.ft., and the theoretical air requirement from 3¾ to 4 c.ft. per c.ft. of gas. The most notable exception among the upper values is the South Metropolitan Gas Company, with a declared C.V. of 560 B.Th.U. As a rough and ready rule, 1 c.ft. fully aerated air-gas mixture represents a potential 100 B.Th.U.

It is too often assumed that the whole matter of aeration can be easily dismissed, and that the theoretical air-gas mixture represents our ideal; that the burning of such a mixture gives the most rapid combustion and the hottest flames; and that the highest thermal efficiency must necessarily follow. It is not quite so simple as that.

That the theoretical air requirement must eventually be attained in order to secure complete combustion is obvious, but the subdivision of that air into primary and secondary supplies, and the regulation of each, provides us with a most valuable adjustment. This is important for the gas fire, and particularly so in the case of the incandescent mantle, for adjustment of the primary air supply will lead to an improved fit between flame and radiant or mantle, which will more than counterbalance the loss in flame temperature consequent upon departure from the theoretical air-gas mixture. In any case, I shall show later that there are few existing appliances in which the primary air supply reaches the theoretical air-gas ratio.

The following formidable list represents some of the factors which must be taken into account in an investigation of aeration problems.

The Gas.	Calorific value, and the gas rate necessary to secure the desired thermal delivery. Specific gravity. Theoretical air requirement. Permissible degree of aeration in burner. Pressure available.
The Burner.	Thermal output of burner. Size and design of nipple orifice (fixed variable, or multiple). Design of injecting tube. Dimensions and shape of burner head. Size, number, and distribution of flame outlets. Air-shutter or other air regulator. General mechanical condition and finish, assembly and alignment of parts.
Other Factors.	Thermal phenomena associated with the heating-up of the burner body or casting. Convection and "chimney-pull" effects. Influence of proximity of body being heated. Suitability of size and shape of flame; these being vital in the case of gas fire and incandescent burner operating. Provision for secondary aeration, completion of combustion, and removal of products.

Time permits a discussion of a few only of the foregoing matters, and this will be preceded by a sketch of some of the methods used in aeration investigations.

EXPERIMENTAL METHODS.

We will suppose in the first place that we wish to examine the flame characteristics of certain gases burning at different rates and with different degrees of aeration. This may be done by preparing suitable air-gas mixtures in a holder, and burning them off at appropriate rates. The method has been extensively used, but is too exciting, even with numerous gauzes in the supply pipes from the holder, to prevent back-firing.

An alternative method consists in metering gas and air in suitable proportions, mixing them at the base of special burners, and observing the flame characteristics of the burning mixtures. This was done by Deville, by Forshaw (who noted serious differences in the flame shape and size of pure hydrogen and carbon monoxide, even at comparable B.Th.U. rates), and by numerous German workers. I will refer shortly to a special modification of this method, used by the American Bureau of Standards. If experiments conducted on the foregoing lines indicate advantages as regards thermal efficiency or ease of operation for any special group of mixtures, it is then worth while trying to reproduce such mixtures in commercial burners.

In whatever is done it must be borne in mind that for economic reasons the burners must be self-contained, of the simplest design, easily controlled, and capable of operating with the gas pressures commonly found in town gas distributing systems to-day—2 to 3 in. water gauge. This brings us to another important group of experimental methods for studying the aeration of actual burners. In this case it is of the utmost importance that the experimental apparatus should not interfere with the normal operation of the burner; otherwise the results fall into the category of flame studies rather than burner studies. The most common method of examination consists in enclosing the air intake of the burner in a box which is maintained at exactly atmospheric pressure by metering in air at a sufficient rate to balance that removed by the injector of the burner. The pressures in burner bodies are so low (generally less than 0·05 in. W.G.) that the pressure on the intake chamber must be maintained at atmospheric pressure within 1/1000 in. W.G. or less, if the test is to represent the condition of the burner without the added apparatus.

There are two notable difficulties in practice. The first is the provision of suitable pressure gauges, though inventors have been busy, and very sensitive gauges have been brought out, of which the "slope" gauge, Chattock gauge, Fry gauge, and various "smoke" gauges such as those of Winkler and Boys may be taken as types. The second difficulty is in providing a sufficiently steady air supply, and of taking out the oscillations due to the air meter. The American Bureau of Standards seem to have been fairly successful in applying this method of burner study, which is both direct and rapid.

In our own experiments the burners have been allowed to operate unhindered, under various conditions, and samples of the mixture from the body of the burner have been analyzed to determine the air-gas ratio. The degree of aeration could be deduced from the degree of dilution of the CO_2 in the gas; but much more sensitive indications can be obtained by burning the sample of mixture over copper oxide and determining the concentration of CO_2 produced, comparing it with that from combustion of a sample of the original gas. Correction may be necessary for the amount of CO_2 in the primary air supply. Sampling tubes about $\frac{1}{8}$ in. diameter were generally used, but in the case of small lighting burners we employed the very fine steel tubing from which hypodermic needles are made.

No sketch of experimental methods would be complete without mention of the work of Dr. J. S. G. Thomas, Physicist of the South Metropolitan Gas Company, on the entrainment of air by small jets, and his development of an extremely small but sensitive electrical meter for the purpose.

The absolute values of the resistance to flow presented by burner bodies, teats, &c., is difficult to define and more difficult to measure. It is, however, much easier to compare the resistances of new burners with those of carefully finished standard burners of the same type, or to compare burner teats with one another. An apparatus devised by W. N. Shaw, in 1890, has been applied by Dr. Hartley, of Radiation Ltd., to the comparison of burner resistances. It is the pneumatic analogue of the electrician's Wheatstone bridge. Standard orifices replace the standard electrical resistances, suitable suction or pressure is applied (corresponding to the E.M.F. of the battery) with the unknown resistance or orifice in the other arm of the bridge, and lack of balance is shown by the deflection of a sensitive draught-vane, usually under magnetic control.

Flame Propagation.

Before leaving the subject of experimental work, attention must be called to the work done at Manchester University on gaseous combustion, associated with the names of Prof. H. B. Dixon, Prof. W. Bone, Prof. R. V. Wheeler, and Dr. F. Coward. The work of Prof. Wheeler, now Head of the Department of Fuel Technology at Sheffield University, is perhaps of the most immediate interest to us. He has measured the rate of flame propagation in air-gas mixtures of various concentrations, using individual pure gases and mixtures of them. The characteristic features are an increase in the rate of flame propagation to a pronounced maximum as aeration increases; but the peak is not coincident with the theoretical air-gas mixture. The most striking point is the huge difference in the rate of flame propagation between hydrogen and methane or carbon monoxide at comparable concentrations. (16·1, 2·1, 2·0 ft. per second respectively for the fastest burning mixture of each with air.)

This has led to the suggestion put forward at one time that there should be inserted in gas specifications a "minimum methane" clause, on account of its effect in "steadying" combustion. It is not clear why CO should not be equally serviceable in this respect. The rate of flame propagation in gas mixtures has been calculated with some success from the data for the individual gases, but the rate of flame propagation in the mixture is not the simple mean of those of its constituents. One important point bearing on the application of Wheeler's figures to gas burner design is that most of his figures refer to homogeneous stationary mixtures, in tubes about 1 in. diameter, whereas in burners we have a moving stream which may be turbulent, and of a streaky character as regards gas and air. There are, of course, other methods of determining the rate of flame propagation, one of which depends upon measurements of the area of the inner cone of the Bunsen flame.

The question naturally arises as to whether or not it is possible to estimate the degree of aeration of commercial burners without resort to the methods I have just indicated, for such expressions as "hard flames," "soft flames," "fully-aerated," "excessive aeration," and the like are in common use, and the matter of burner adjustment by visual observation is of some practical importance.

It is, of course, frequently necessary to adjust flames to be stable and with well-marked inner cones. This does *not* correspond with a uniform air-gas ratio, nor with a definite fraction of the theoretical air requirement of the gas with all grades of gas.

The following table calculated from data supplied by the American Bureau of Standards shows the degree of aeration in a typical ring burner working at the same B.Th.U. rate with gases of different qualities. Air-shutter adjustment was made to produce normally aerated flames as judged by the eye.

Calorific Value.	Specific Gravity.	Mean Air-Gas Ratio at 3 to 5 In. Pressure.	P.Ct. Theoretical Air Requirement.	Rate of Flame Propagation in Ft. per Second at Cone Surface.
Water gas—				
600	0·68	2·50	45·8	0·76
550	0·66	2·50	50·0	0 93
500	0·63	1·99	44·4	0·91
450	0 61	1·50	39·8	0 82
400	0 60	1·42	41·7	1·02
350	0 58	0·94	32·4	0·90
300	0·57	0·65	26·4	1·07
Coal gas—				
525	0·44	2·14	46·5	0·90
Coke-oven gas—				
500	0·55	2·10	55·0	0·98
City gas*—				
500	0·62	2·36	55·0	0·92

* Coke oven gas to carburetted water gas 2 : 1.

From the last column of the above table it would seem that unconsciously the flames have all been adjusted to about the same rate of flame propagation.

The second feature is that, as the C.V. of the gas is reduced, the air-gas ratio falls, and falls so far that, notwithstanding the smaller absolute air requirement of the gases of lower C.V., it results in a smaller percentage of the theoretical air requirement being attained as the C.V. is lowered. This is clearly not due to mechanical inefficiency of the injector, which presumably would be capable of injecting as much air with the lower as with the higher grades of gas.

You will find in the text books of twenty years ago figures for the amount of air necessary to render a Bunsen flame non-luminous, and to yield specified flame characteristics. For example, Lewes gives the following for 16-candle gas (say, 600 B.Th.U. gross).

Slightly luminous tip—air-gas ratio less than	2 : 1
Ordinary bunsen, violet inner cone, air-gas ratio	2·3 : 1
" " green " " " "	2·5 : 1
" " marked roaring " "	2·6 : 1

Since the time these figures were obtained there has been a progressive lowering of the C.V. of town gas, and from observations with typical gases to-day of 475 to 500 B.Th.U. gross per c.ft., I should estimate that 1·1 to 1·3 volumes of air per volume of gas will destroy luminosity, 1·5 volumes will yield Bunsen flames of a medium character, while with just short of 2 volumes of air the flames will be hard and frequently of a roaring character

To obtain the necessary air injection and a high efficiency with a "rich" gas of (say) 550 B.Th.U. upwards requires the utmost care in design, workmanship, and adjustment of the burner, especially in the case of lighting burners. Apart from the very great advantages which it has conferred in opening-up fields for the utilization of poorer coals, and the exploiting of more economical methods of carbonization, the drop in C.V. has materially improved the performance of burners of ordinary workmanship and finish. The drop from 600 to 500 B.Th.U. has made just the necessary reduction in primary air requirement to come within the air-injecting capacities of reasonably designed burners. On the other hand, so far as this point is concerned, there does not seem to be proportionate advantage in dropping below 475 or 450 B.Th.U., as faulty aeration is not a general source of inefficiency below 500 B.Th.U.

Excessive Aeration.

If flames are very hard, roaring and unstable, with a tendency to strike back, this is clearly, and in a practical sense, "excessive aeration." From what I have already said it is plain that the popular assumption that this represents practically complete aeration is entirely wrong. For the general run of burners working with 475 to 500 B.Th.U. gas, whether they be lighting burners, gas rings, or gas fires, I should expect the primary air-gas ratio to range from 1·5 to 2·0 volumes of air per volume of gas—*i.e.*, something close to 50 p.ct. of the theoretical air requirement of the gas—while the so-called "excessive" aeration would correspond to little more than 60 p.ct. of the theoretical air requirement of the gas.

Recently I have had occasion to measure the degree of aeration of a Meker burner working on 475 B.Th.U. gas, and commonly alleged to have a more highly aerated flame than an ordinary burner, even approximating to the full theoretical air requirement of the gas. The figure actually obtained was 2·6 volumes of air per volume of gas, or only 70 p.ct. of the theoretical air requirement. This was not due to inefficient injection, for it was necessary to fit an air-shutter to the burner in order to keep the flames from running down into the grid at the burner head. There is a feature common to many of these observations that the primary air supply falls short of the theoretical air requirement of the gas not because of any inefficiency of the injector, but because the fully aerated mixture is not capable of yielding stable flames with the existing types of burner head. In practice it does not follow that reduction of C.V., with consequent reduction

in air requirement, will result in any relative increase in the usable degree of aeration—a point apparently overlooked by some of the advocates of low-grade gas.

I do not in the least wish to suggest that, because of the less stringent air requirement, second-rate workmanship is permissible in gas burners. For example, in the modern silent gas fire an extremely efficient multiple-orifice injector is employed which ought to yield a high air-gas ratio. Actually it does not, because the mixture has to overcome the resistance of perforated discs in the burner caps, placed there to improve uniformity of the mixture, prevent back-firing, and steady the flames, and the necessary energy could not be developed by a more crudely made injector. Incidentally very steady flames can be obtained by injecting gas into long straight tubes, as those who have seen the Smithell's flame separator will know.

There is one interesting observation of practical importance common to all the burners we have examined, and it is that, as the burner body becomes heated by conduction from the burning gas (or by radiation in certain cases), the air-gas ratio invariably falls—*i.e.*, if an air adjustment is made too early after lighting the burner (and consideration of the time which fitters can reasonably expend on adjustment must be taken into account), the flames may subsequently "soften" to an undesirable extent. Our own experiments showed a reduction in aeration of about 10 p.ct. with gas rings and gas fires.

The opposite difficulty may occur with lighting burners. For example, a burner may be allowed to heat up, and then be adjusted to maximum illuminating power while hot, using a very hard flame. If such a burner is extinguished and allowed to go cold, it may not be possible to re-light on that adjustment without back-firing, on account of the greater rate of flame propagation in the more highly aerated mixture formed on starting with the cold burner.

We can, of course, close the air slide temporarily, but this is not possible in street lighting installations or with clock-controlled burners. Certain low-pressure and most high-pressure burners are fitted with so-called "thermostats," the function of which is to cut down the degree of aeration on starting up until such time as the heating of the burner itself supplies the necessary back-pressure to prevent excessive aeration and back-firing.

High-Pressure Burners.

The higher temperature and greater efficiency of the high-pressure gas burner depend upon the attainment of higher velocities in the burner, so that more rapidly-burning air-gas mixtures can be utilized, implying the development of a greater number of heat units in a given space.

Experiments were made with a 1000-c.p. high-pressure lamp working at 68 in. pressure on gas of 472 B.Th.U. gross per c.ft. The air-gas ratio attained with the air regulator fully opened was 4·58 : 1. This was in excess of the theoretical air requirement of the gas being used; but the best illuminating power was obtained when the primary aeration was brought down to slightly less than the theoretical air requirement, 89 p.ct. yielding the best all-round results. In view of the fact that little more than half the total air requirement of low-pressure burners is supplied as primary air, it is plain that much greater attention should be paid to the provision of a satisfactory supply of secondary air, uncontaminated with products of combustion.

You will observe that so far I have limited myself to statements of facts and to typical aeration figures for burners as they exist to-day. No attempt has been made to put forward formulæ for burner design, nor for calculation of the degree of aeration of existing burners. Considerable success has attended the calculation of injection by water injectors and steam injectors; and at first sight there seems to be no reason why gas injectors should not be treated on the same lines, working from first principles and equating either the momentum or the energy of the gas jet to that of the air-gas mixture forced out at the burner head.

More advanced treatment will include allowances for frictional loses at burner intake and exit, and for losses in passing through the burner. Early in our work we made experiments with the simplest possible type of apparatus, injecting gas axially into straight horizontal glass tubes of various diameters and about 3 ft. long. (Ninth Report, Gas Investigation Committee.)

Experiments were afterwards made with simple ring burners. Generally speaking, the momentum of the air-gas mixture leaving the burner was less than 10 p.ct. of the momentum of the injecting gas jet, so that equating these two is clearly inadmissible. Despite this experimental evidence, it was plain from the discussion which followed the presentation of the Eleventh Report of the Gas Investigation Committee that the impression still persisted that such calculations were legitimate and of practical value.

Frictional Losses.

The principal sources of energy absorption—namely, impact and frictional losses in passing through the burner—do not receive consideration. Perhaps the most noteworthy attempt at a mathematical treatment is that made by H. Pfotenhauer, Physicist to the Auer Company, remarkable for the large number of factors which he has endeavoured to take into account. The type of formula developed for air injection in a simple type of Bunsen burner, taking into account gas rate, pressure, specific gravity, and the length, air-inlet area, outlet area of the burner, and the viscosity of the mixture passing through the burner, is as follows:

$$q = \frac{-\frac{\beta}{2}\left(1+\frac{\gamma_1}{\gamma_2}\right)}{\beta+\frac{1}{3}\left(\frac{m}{n\mu_2}\right)^2-\frac{m}{m-1}} + \sqrt{\left[\frac{\frac{\beta}{2}\left(1+\frac{\gamma_1}{\gamma_2}\right)}{\beta+\frac{1}{3}\left(\frac{m}{n\mu_2}\right)^2-\frac{m}{m-1}}\right]^2+\frac{\frac{\gamma_2}{\gamma_1}\left(\frac{m}{a_1}-\beta\right)}{\beta+\frac{1}{3}\left(\frac{m}{n\mu_2}\right)^2-\frac{m}{m-1}}}$$

A number of the above constants are not general constants, but require to be empirically determined for the burner under observation. If you will complicate matters further by considering thermal changes taking place in the air-gas mixture as it traverses the burner body, and points like Venturi tubes, and the complex internal shapes taken by the burners attached to modern domestic gas appliances, you will appreciate that mathematical treatment may become so unwieldy as to be of little service in practice.

The American Bureau of Standards puts forward the view that there is a constant ratio (as distinct from equality) between the momentum of the injecting gas jet and that of the air-gas mixture issuing from a burner, so long as the mechanical condition of the burner is unaltered; that this ratio is a characteristic constant for each particular burner, despite variations in gas rate, pressure, or specific gravity; and that it can be experimentally determined.

If this were true, a limited number of experiments under

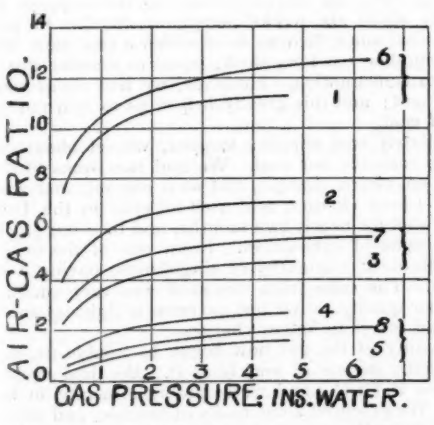


Fig. 1.—Air Injection in Plain Tubes using same Jet Throughout.

Curves 1 and 6—Tube 1·24 in. dia.
" 2— " 0·83 " " } Upper curve of
" 7 and 3— " 0·63 " " } bracketed pairs
" 4— " 0·43 " " } Sp. gr. of gas = 0·67
" 8 and 5— " 0·32 " " } Remainder = 0·48
Jet dia. = 0·0559 in.

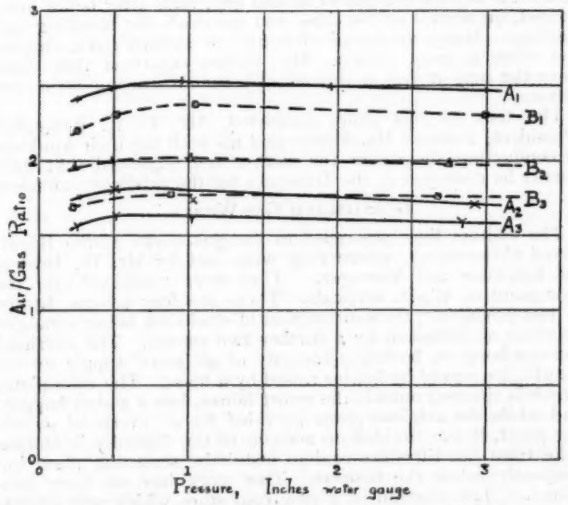


Fig. 2.—Gas Fire. Relation between Air-Gas Ratio and Gas Pressure.

Curve A_1—Burner cold—air shutter fully open. Sp. gr. gas = 0·54
" A_2— " " " " partly closed. " " "
" A_3— " hot " " " " " "
Curves B_1, B_2, B_3, corresponding curves for gas sp. gr. 0·49 and suitable air-shutter adjustment.

selected conditions would enable us to forecast the behaviour of the burner under other working conditions.

While this is true in certain cases, it does not apply in many of our experiments with domestic boiling-burners over the pressure range 1 to 3 in. water gauge, and cannot therefore be regarded as a satisfactory generalization. It may be of interest to show typical groups of aeration curves; and I have selected fig. 4 from the Ninth Report of the Gas Investigation Committee (our fig. 1) and fig. 11 from the Eleventh Report (our fig. 2) as characteristic.

Fig. 1 refers to experiments with plain glass tubes and gases of Sp. Gr. 0·48 and 0·67 respectively. The first thing to strike one is the extremely high degrees of aeration attained in certain cases with moderate pressures; quantities of air being injected far in excess of that theoretically necessary for complete combustion of the gases used, or even for a rich gas such as one of 600 B.Th.U. per c.ft. The velocities attained by the mixtures in the larger tubes are far below the rates of flame propagation for the mixtures concerned; and it would therefore not be possible to maintain a stable flame on the ends of the tubes. Observe the greater degree of aeration with a gas of higher specific gravity in the case of the bracketed pairs of curves (same gas jet used for all experiments).

In the early stages the aeration increases very rapidly with pressure, but above 2 in. water gauge the further increase in the air-gas ratio with increase in pressure and gas rate is much smaller, and the air-gas ratio approaches a steady value. The steeper curves are characteristic of an appliance with a small outlet resistance.

The other curves refer to a gas fire, and show a nearly constant air-gas ratio over the working range of the fire. This type of curve is characteristic of a burner with considerable inlet and outlet resistances, and there may even be a slight reduction in air-gas ratio if the pressure and quantity of air-gas mixture go beyond a certain point.

The suction developed by gas injectors is very small, and the pressure in burner bodies are frequently less than 0·05 in. W.G. Convective effects may therefore become relatively important in burners of any notable vertical length. In the case of the upright incandescent burner (now nearly obsolete) the pull of the chimney assists aeration, while in certain types of downward-injection inverted burners the convective effect opposes the action of the injector, and in addition the primary air supply is drawn from a region of heated air contaminated with products of combustion.

In the same way cases have come to our notice in which gas fires were suffering from defective primary aeration because the design permitted the pull of the chimney to be applied to the air-intake, and act in opposition to the injector.

I should like to feel that I have given you something to think about, and a judicious mixture of scientific material and of practical information with regard to the aeration of burners.

My thanks are due to Prof. Cobb and to the Institution of Gas Engineers for the use of information on aeration published in the Ninth and Eleventh Reports of the Gas Investigation Committee (to which reference should be made for details of experiments upon aeration, and the effects of gas rate, pressure, specific gravity, and burner resistance) together with much unpublished data with which it has been my lot to deal while acting as Research Chemist to the Committee.

The PRESIDENT asked Mr. Wood to convey the thanks of the Association to the Yorkshire Juniors for their kind message, which was reciprocated. As to his contribution on "Aeration," Mr. Wood had devoted much time to research work, and the members of the Association greatly appreciated the compliment of having such a paper presented to them.

Mr. A. R. MYHILL (Junior Vice-President) proposed a vote of thanks to Mr. Wood for his excellent contribution.

The resolution was seconded by Mr. J. H. GEE, who commented upon the lucid way in which Mr. Wood had dealt with an intricate subject. The vote was carried with acclamation.

Mr. T. F. E. RHEAD (Chief Chemist, Birmingham Gas Department) expressed the view that a practical difficulty with burners at the present time was that of corrosion, particularly in the case of incandescent burners working with a by-pass. This, he thought, was due to the fact that, while the by-pass was burning, the metal-work was sufficiently cold to condense the moisture in the gas and thus give rise to corrosion. It all pointed to the necessity of eliminating the sulphur in the gas; but, up to the present, nothing had been found sufficiently economical to do this.

Mr. F. A. PYKETT (Coventry) associated himself, as an old member of the Yorkshire Association, with the message of goodwill from the Midlands to Yorkshire.

Mr. WOOD acknowledged the vote of thanks.

SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).

The Meeting of the Scottish Junior Gas Association (Eastern District) on Feb. 11 proved highly successful. Assembling at the Pettycur Works of the Kinghorn Bottle Company, Ltd., the party were received by Mr. Mason, the Manager, and were shown over the entire plant.

PETTYCUR BOTTLE WORKS.

It was explained that the melting furnace, kept at a temperature of 1400° C., is served by producer gas. When the feeders are not in use—*e.g.*, during the week-end—the temperature is maintained by town gas supplied by the Kirkcaldy gas undertaking. The annealing ovens, also heated by producer gas, require a temperature of 600° C., and have a travelling belt on which the bottles are placed at one end, and, after being heat-treated, on arrival at the other end are ready for handling and packing. Many specimens of bottles of various sizes, shapes, and colours, were shown. Mr. Mason explained that these were the only works in this country manufacturing an amber bottle.

The tour of this plant completed, Mr. E. L. FARQUHAR (President) thanked Mr. Mason and his staff for their kindness in conducting them over the works, and requested that their thanks be conveyed to the Directors for the privilege extended.

BURNTISLAND GAS-WORKS.

The visitors then proceeded to the gas-works of the Burntisland Corporation, where they were met by Mr. W. Brown, the Engineer and Manager. They were conducted over the new plant of W.-D. verticals. There are four retorts, heated by two producers; the construction of steelwork being arranged to allow of extension by a further two retorts. The overhead storage hoppers, having a capacity of 48 hours' supply for six retorts, are served by bogies raised by a hoist. The coke plant, which is situated outside the retort house, has a 50-ton hopper; and while the original plans provided for an overhead screening plant, it was decided on account of the difficulty in storing coke from the Fifeshire coal to instal the screening plant immediately below the hoppers. This work has not been completed. The erection of a new coal store which will obviate the need for trimming and hand-filling of bogies is at present proceeding.

Following the inspection, the visitors adjourned to the George Hotel, where they were met by Provost Dempster, several members of the Town Council, and Mr. Gilmour, the Town Clerk.

The PROVOST, in welcoming the Scottish Junior Gas Association to Burntisland, referred to the excellent work being done by the gas industry towards the improvement in the health of the general public, by the abolition of smoke, and the saving of labour.

Mr. FARQUHAR replied, and referred to the pleasure it afforded all members to meet, in Mr. Brown, of Burntisland, the third President of the Association, and one who had done so much towards its inception.

On the invitation of the Corporation Commissioners, the visitors were entertained at tea.

HORIZONTALS AND TULLY GAS PLANT DURING THE COAL STRIKE, 1926.

By T. MACKIE, of Kelty.

Following the usual practice in a colliery district, we do not, as a rule, carry big stocks of coal, so the stoppage found us with only about six weeks' supply in hand. In passing, I may say that since then we have added a coal store which will give us another 200 tons stock, equal to another three weeks' maximum consumption. However, we had about 100 tons of coke in hand; and this greatly helped us to spin out our small stocks of coal.

Immediately coal supplies stopped, we set about employing means to conserve our coal. We had two ovens of six retorts working on 5-hour charges, but shut one off, and worked the other on 4-hour charges, and used all coke in the Tully plant. All went well for nearly two months, and then our stocks began to show signs of exhaustion. From one of the neighbouring pits we obtained a quantity of single nuts, paying a stiff price for them. The coke from this stuff was very small, and the gas of poor quality, so we had perforce to light-up another oven again, and revert to longer charges.

The quality of the gas now began to trouble us, so we had to find some means of enriching it. We had dropped from 450 to 400 B.Th.U., and were finding difficulty in keeping it at that. We procured some casks of benzole, and experimented with enriching the gas at the inlet to the town governor. We had 9 ft. of 8-in. cast-iron flanged pipe lying in the yard. On this we put blank flanges, boring and tapping one end for ½-in. steam and the other ¾ in. for condensation. A coil was put inside the pipe for the benzole to trickle through. The inlet end of the coil was connected to the cask, and a sight feed was put on that pipe, so that we could regulate the benzole. The

other end of the coil was connected to the outlet main to the district. We found by this means that we could enrich the gas by 10 to 20 B.Th.U.; and we kept this going during the rest of the period.

As we had now great difficulty in getting any more home coal, we had, like other works, to try some of the foreign stuff. Our first was Silesian nuts. This was supposed to be washed, but there were many pieces of stone, and the ash content was high. It was nearly all singles, and, being a non-caking coal, the coke was very small.

Silesian Washed Nuts.

H_2O	11·5
Gas, tar, &c.	30·0
Fixed carbon	44·9
Ash	13·6
	100 0

Westphalian screened coal was next tried; and, as the analysis shows, the quantity of gas was low (but rich in quality), and the ash was moderate. It was an excellent coking coal.

Westphalian Screened Coal.

H_2O	2·0
Gas, tar, &c.	19·4
Fixed carbon	72·3
Ash	6·3
	100·0

I come now to a consignment which did give us trouble—viz., Lens unscreened. The coke from it clinkered hard in the producers; and instead of fires going for six weeks without clinkering, we had to clean them out every day. The coke in the water gas plant behaved in the same way. Our usual practice was to clinker out once a month; but a week-end of this stuff was enough. In fact, the clinker got up into the nostril holes. The analysis of this coal was:

Lens Unscreened Coal.

H_2O	2 0
Gas, tar, &c.	19·9
Fixed carbon	38·0
Ash	40·1
	100 0

Our next and last consignment of foreign coal—and, I may say, the best—was American, Kanawha Thacker. It proved ideal for our requirements. It was an unscreened coal, and was received for the most part in the form of dross, but it coked very well. The coke had a grey appearance, was very hard, and was most suitable for the water gas plant.

Kanawha Thacker.

H_2O	2·3
Gas, tar, &c.	32·25
Fixed carbon	55·55
Ash	9·9
	100·00

This coal was not suitable, owing to its soft nature, for gasification in the Tully plant. The tar was very thick, and necessitated steaming of the storage tank for pumping and filling purposes.

During the whole period of the stoppage we were able to keep up the normal supply of gas, and the consumers were put to no inconvenience whatever.

One great advantage which a plant of the Tully type possesses is the ability to use either coke, a mixture of coal and coke, or all coal. This allows advantage to be taken of the state of the coke market, which we have done frequently, with financial benefit. For example, with coal at 16s. 6d. per ton delivered, and coke at 20s. 6d. at works, it certainly pays well to gasify as much coal as possible in the Tully plant.

In the selection of coal for this plant, experience has taught me not to use a coal that swells to any extent, as it is inclined to hang up in the retort. In fact, I find a good guide is to reject any sample which leaves a red clinkering ash, and give preference to one with a white ash.

The following are our results for the seven months ended Jan. 31:

Gas per ton	15,181 c.ft. of 450 B.Th.U. gas
Coke ,,	8·62 cwt.
Tar ,,	10·22 gall.
Wages—coal wagon to coke wagon	3·93d. per 1000 c.ft.

During the month of December last (our heaviest month) we made an average of 172,000 c.ft. per day with three stokers and the Tully plant on 12 hours per day. This works out at 38,200 c.ft. per man per 8-hour shift at a wage cost of 2·70d. per 1000 c.ft., including steam-raising and ashes.

Supplying, as we do, a purely mining district, I often wondered what the miners would have done had the gas supply ceased early in the strike, and no coke been available for baking bread. Would it have brought home the futility of the situation more clearly and earlier than it did? One lesson it ought to teach is this, that the price of gas should go up at once to meet the extra expenditure. The aftermath has enough to do with itself, without having to carry the legacy of the foolish policy of endeavouring to settle disputes through strikes. The public generally have notoriously short memories, and expect, immediately a strike ceases, that normal prices should be resumed.

Discussion.

The PRESIDENT said he was interested in the enricher installed at Kelty during the period referred to, and considered that, by having such a plant ready for use, it would provide a handy stand-by for any future emergency. He was impressed with the flexibility—in special reference to the state of the coke market—of the Tully plant. He agreed that the price of gas in such circumstances as were referred to should be raised immediately.

Mr. R. J. GAVIN (Kirkcaldy) remarked that he was interested in the lay-out and method of operation of the enricher. He would like to know in what proportions the coal gas was mixed with the water gas. What was the output per retort, and was it not found essential to use more of the plant for a given quantity of gas? He pointed out that a high volatile content did not necessarily give a high calorific value. He considered that the gas industry, during the coal trouble, had certainly proved itself a national asset; and the Kelty undertaking were to be congratulated on their splendid efforts.

Mr. JOHN RICHMOND (Penicuik), speaking of Lens unscreened coal, observed that it must have had a large percentage of iron. The 40 p.ct. ash was exceptional. He was interested in the statements made in regard to costs of the Tully plant, but he had so far failed to see where these operating costs had shown an effect on the price to the consumer.

Mr. A. DORAN (Granton) said that he too was interested in the method of enriching, as, some years ago, during the war, he had used petrol. It was found that a large amount of petrol vapour condensed out again. What was Mr. Mackie's experience in regard to the absorption with benzole spraying? Proximate analysis, he considered, did not give much definite information. What apparatus was employed in the determination of calorific value?

Mr. D. GARRIE (Burntisland) asked whether, if it was the case that during the strike the calorific value had been 400 B.Th.U. or lower, and no dissatisfaction was expressed among consumers, the pressure had been increased.

Mr. MACKIE, replying, said that when the enriching process was stopped, though they had a thought of leaving the plant in order, it was dissembled. Nevertheless, he agreed that such a plant would be a useful stand-by, judging from the service it performed at the time. The output per retort was a difficult figure to give, as their mixing took place in the hydraulic or the foul main. There was a large amount of iron in the ash of the Lens coal. With regard to costs, seven or eight years ago, when their make was 30 millions per annum, seven men were employed. Now, with two ovens of six retorts and their annual make at 48 or 50 millions, there were only three men employed. Moreover, if the Tully plant had not been installed, they would have had to extend the retort house. In connection with benzole enriching and condensation, they had put-in the benzole in the form of a spray or mist, with a feed of only a drop or two per minute. They never had any trouble with condensation. The calorific value tests were carried out on a Boys calorimeter. The value was never below 420 B.Th.U., and no trouble whatever had been experienced with inadequate pressures.

A hearty vote of thanks was passed to Mr. Mackie for the paper.

Mr. Andrew L. Duff, of Granton, was then called upon.

THE QUESTION OF COKE.

By ANDREW L. DUFF, of Granton.

Coke propaganda is essential at the present time throughout all districts, irrespective of size, to educate the manufacturer and householder regarding the most efficient and economical ways in which gas coke should be used. Attractive advertising is necessary to assist this work, but it is also essential to bring as much personal supervision into it as possible. Throughout a large town where coal is consumed in large quantities, in various classes of fires and boilers, a large percentage of smoke is emitted, to the annoyance and discomfort of the general public. Only certain sections of the public assert themselves to stamp out this nuisance, so it is up to the gas industry to show the way until all the gas coke produced can be consumed locally.

It is necessary to deal with this matter systematically, and it is advisable to work on the class of boilers where good results are being produced. By interviewing a number of your present consumers, valuable information can be obtained. At the outset, it is necessary to locate where these boilers are in use; and a method of obtaining this information would be to instruct the Meter Reading Department to collect same. It is then necessary to divide the area into districts, and interview the boiler users. The next point is to consider what classes of large boiler are employed. These may be (1) Lancashire, (2) Cornish, (3) vertical, and (4) various types of water-tube. With regard to (1), it will be found that where a steady pressure is required, favourable results can be obtained. (2) These are not so good, and no time should be spent meantime on them. It is advisable when introducing coke for coal-fired boilers to arrange a test and, if possible, to have a boilerman from the gas-works who is acquainted with coke firing. In the majority of cases where large boilers are in use, the management take little interest in the boiler plant, and are pleased if it gives results comparing favourably with the previous year. With regard to (3), success is almost assured where a steady pressure is required; the time should be spent concentrating on this class of boiler throughout the various districts. I

would like to emphasize the point that personal supervision is essential, because it is proved that where a boilerman has been accustomed to coal firing, he finds it somewhat difficult to adjust himself to the use of coke. In the case of upright boilers, a few instructions should be left for the boilerman's guidance, as follows:

> Clean the fire out, and remove any clinker and dirt. A layer of coke should be placed round the firebox, and a space left for sticks and paper. Light up then; and after a few minutes' burning, cover with coke. Fill up to level of firebox, or to whatever depth required. Always keep a level fire, and keep firebars well covered. Pick out whenever the fire gets dim below firebars, and remove any clinker, and fire-up as before. Every hour the fire should be attended to. At night the top and bottom dampers should be closed, and there should be no necessity for lighting in the morning. When the fire is left at night, it should be built-up either at the front or at the back, if possible. This saves raising steam in the morning, as it has a tendency to destroy the joints of the doors when the water is cold.

Boilers of the upright type are to be found in all sorts of places in a large town, and are utilized in restaurants of moderate size, hotels, milk sterilizing, laundries, coffee making, and in a large number of small works. Their consumption of coke may be small, but you will find that this class of fuel compares favourably with any other. The introduction of a free trial, for an afternoon, is a good way of bringing to the notice of probable clients the advantages to be obtained by the use of coke; and a permanent order is likely to follow.

In briefly summing up the boiler question, in my opinion the vertical boiler, along with the slow combustion type, is first in the field for coke burning. Then comes the Lancashire boiler; but unless adjustments are made, the fuel consumption will not permit the question being considered. In boilers with forced draught in operation, breeze could be introduced as an alternative; but it is essential to consider—with such fuel in use—the dimensions of the flues and also the situation of the boiler and the requirements in steam.

DOMESTIC USES.

Coke as a domestic fuel requires careful attention. To burn coke in the kitchen range is a matter of ease to some, and to others a matter of difficulty; and many are the questions asked of the coke salesman. The following are typical examples: Will it burn? Does the fire require much attention? How about dust? Is it cheaper than coal?

To all such questions a ready and correct answer must be given, and an endeavour made to obtain a trial. If such be granted, care should be taken to give every satisfaction in the matter of attention and guidance. In the kitchen grate where a good draught is to be found, the consuming of coke should offer no difficulties; and instructions as follows should be found beneficial to the housekeeper:

1. After the fire is started, lay the coke on evenly.
2. Do not interfere with the fire in any way, but allow it to fall of its own accord.
3. Dust can be overcome by gently easing the ash away from the grate.
4. Always keep a deep fire-bed.

In the average room fire, the prevailing conditions are not so well adapted for coke consumption; but by the introduction of a wire gauze, and by making the fire-bed deeper, good results can be obtained. It takes time to overcome householder's difficulties, but by converting a person to coke burning, you are really increasing your salesmen. Unfortunately, apathy is shown by gas employees with regard to gas coke. As gas consumption increases, so will saleable coke; and it is up to everyone in the gas industry to increase home consumption. If they find they cannot answer the questions asked, rather than give a wrong answer they should refer the matter to the department concerned, and not treat it lightly.

It is necessary to see that the coke sold to the consumer is free from foreign matter, so that complaints can be kept at a minimum. Healthy competition is necessary in all undertakings, but by overlapping in certain districts the coke market is drifting into the hands of the speculator; and this should be avoided.

By working in close co-operation with the Smoke Inspector, I found that a great amount of business could be procured through this source. You will find that he is harassed by various smoke complaints, and his only alternatives in overcoming the nuisance are to introduce a smoke consuming device or coke. It is up to us as smokeless fuel experts to see that coke is used to give efficient and economical results.

A great amount of experimental work is still to be accomplished before progress can be definitely established; and I think the time has come when the gas industry should take as much interest in boiler construction as they do in gas appliances. District representatives should gather together periodically to exchange opinions regarding coke burning, for much useful information could be obtained in this manner.

The speaker thereafter displayed several posters and line drawings of new types of coke fired boilers for domestic purposes, and distributed to his audience leaflets adopted by the Edinburgh Corporation Gas Department in their coke propaganda.

Discussion.

The PRESIDENT agreed that personal supervision in addition to attractive advertising was essential in coke propaganda. The suggestion that when introducing coke to coal-fired boilers a boilerman with some knowledge of coke-firing should supervise the work was a good one. Unless care was devoted to the stoking, pricking-up, and cleaning of fires, &c., the most efficient results could not be obtained. There were in the case of domestic coke one or two objections which served to hinder progressive sales. One of the difficulties was the large proportion of ash. Though the ideal state of affairs was to have a proper fire designed for coke burning, it would be some time before this propaganda could bring about universal adoption. Cracking and spluttering was a prevalent cause of complaint. His own experience was that some cokes were worse offenders than others, due, no doubt, to the different coal. The mode of quenching was also a factor. Whether for industrial or domestic uses, he considered it imperative that the coke be carefully graded and prepared for the market. It was not sufficient merely to fill-up with a fork from the bing. Anthracite was, in his opinion, a formidable opponent in some quarters. He would give them the results of a test carried out recently in a school in an adjacent town. The test was carried out over a period of two weeks. The costs were:

First Week.

	s.	d.
Coke per ton . . . . . =	27	6
13 cwt. coke per day . . . . . =	18	0
Carting . . . . . =	1	9
	19	9 per day.

Second Week.

	s.	d.
Semi-anthracite "all-in" costs per ton =	35	0
17 cwt. semi-anthracite per day . . =	29	9

A difference of 10s. per day.

Further, he had learned that with the semi-anthracite, which was in large pieces, the janitor of the school had to devote all his spare time to breaking it up into a convenient size. Pure anthracite sold at 52s. per ton, and was almost prohibitive on that account.

Mr. D. GARRIE (Burntisland) said he recently had a test to make on coke, arising from a complaint that it would not burn. From the results, he found that size was an important factor. A workman's brazier was employed as the criterion, and the coke, originally 4 in. to 6 in. cube, would not burn. It was, however, reduced to walnut size, and gave very good results. "Crackling" coke, he thought, was due to the moisture content.

Mr. JOHN SCOBIE (Dunfermline) observed that in boilers of the forced-draught type, using coke or breeze, much grit found its way through the furnace and even up the chimney. On one occasion he had cleaned from a soot blower, after 24 hours' use, 1¼ carts of grit. Efforts should be continued to gasify as much as possible, and, for domestic purposes, boost the gas fire. He had tested the "Glow-Worm" coke fire, and while the cost of the fire in the first instance was high, very good results had been obtained. Coal and coke had been tried with no success until small coke about ⅜ to ⅝ in. was used. The quantity burned in one day was 12 lbs., costing 1½d.

Mr. JOHN RICHMOND (Pencuik) believed that the fact that coke was not generally used was due to prejudices of boilermen in industrial concerns.

Mr. A. DORAN (Granton) asked what effect the use of coke might have on a copper boiler.

Mr. R. J. GAVIN (Kirkcaldy) considered that smoke prevention made no appeal to the housewife's imagination. On the other hand, labour-saving certainly would. Gas fires, of course, for occasional use, were the best proposition. In regard to boiler users, it would be difficult to convince them that coke at 25s. per ton would be better than a low-grade coal—say, duff at 6s. The balance-sheet was usually the first consideration, though from a thermal point of view coal was inefficient.

Mr. D. YULE (Alloa) observed that the almost universal use of the gas cooker had contributed largely to the installation of independent boilers for water heating. Prof. Barker had said that the old coal range serving the dual purpose of heating water and cooking was only 7 p.ct. efficient. The efficiency of reputable types of independent boilers was in the region of 60 p.ct. By using coke, labour was saved, since there was no smoke or soot.

Mr. W. BROWN (Burntisland) remarked that they never had any difficulty in disposing of their coke. In a shipyard in the vicinity, where the supply of coke was from 10 to 15 tons per week, a small breaker had been introduced, which eliminated possibility of complaint as to size.

Mr. DUFF, in reply, said that he had traced "crackling" to one kind of coal, and now no difficulty whatever was experienced. He was particularly interested in the figures quoted by Mr. Farquhar. In regard to copper boilers, he realized there was a fierce heat from coke, and there was no coating of soot formed, as with coal. This might cause trouble. In connection with low-grade fuel, this emitted a great amount of smoke. The smoke inspector who was concerned with the health of a community could help very considerably in coke propaganda. In Edinburgh the practice was to grade coke by a double screening arrangement into breeze, peas, nuts, and coke.

The proceedings terminated with a hearty vote of thanks to Mr. Duff.

Society of Chemical Industry (Nottingham Section).—The Hon. Local Secretary, Mr. W. T. T. Ainsworth, informs us that a meeting of this Section will take place at University College, Nottingham, on March 7, at 7.30 p.m., when Mr. F. S. Sinnatt, M.B.E., M.Sc. (Tech), F.I.C., of the Fuel Research Board, will read a paper on "The Formation and Structure of Cenospheres. A Study of the Carbonization of Coal in the form of Particles."

AN ELEVATOR SAFETY DEVICE.

The following two devices have recently been adopted with considerable success at the Slough Gas and Coke Company's works as a result of the ingenuity of one of their mechanics. In briefly outlining the designs and their application to every-day working, the Engineer and Manager (Mr. H. Wilkinson) has in mind that perhaps they may prove worthy of a trial in other works, in which case any further information or details required should be referred to him.

An Electrical Safety Device.

By adoption of this arrangement, due warning is given of any working-out of elevator pins, thereby enabling the trouble to be remedied forthwith, and thus ensuring freedom from breakdown in this direction. The device is fixed on each side of the elevator, and consists of an outer cylindrical casing suitably supported from the side sheeting, with a concave slot cut at a point around the top circumference, and a suitable switch arrangement fitted at the base.

Within this casing works a solid plunger, fitted at the top surface with a blade attachment of such projection and at such an angle that it is capable of being levered by a protruding elevator pin. At the base are two contact screws to make contact with the above-mentioned switch. Allowance is made for providing the correct tension for the pivoting of this plunger within the casing, by means of a small projecting stud working within the concave slot. Additional safety tension is allowed for by the insertion of a set-screw in the outer casing, thus ensuring that the plunger will only be released by contact through the blade with an elevator pin, no other thrust having any effect. An outer covering sheaf between plunger and casing protects the switch from any dust or foreign matter.

The two complete devices are wired up with an electric bell in conjunction with dry batteries. It will be seen that a pin working loose and projecting strikes the arm, causing the plunger to drop, and, in so doing, make contact with the switch, thereby completing a circuit and giving a warning ring to the elevator attendant.

An Elevator Lubricator.

This design is of value where continuous lubrication is essential, but is frequently given only occasional attention—*i.e.*, continuously running elevator chains, and the like. The lubricator consists of an outer rectangular oil container suitably supported and bushed to allow a shaft to run through same. To this revolving shaft is attached by suitable means a roller fitted with a scoop. The drum is constantly being dipped in the body of oil fed to the container, and the adhering film is caught by the scoop and discharged therefrom to a trough suitably affixed to the container sides. From the bottom of the trough, outlet pipes and control taps are provided as necessary, and pipes are led to the slides and chain. It will be seen that continuous lubrication is afforded with the running of the elevator by merely opening the oil flow taps; any excess of oil passing to the trough over and above requirements overflowing to the reservoir in the container.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held at the Gas Offices, Cardiff, on Jan. 7—Mr. T. V. Blake presiding. Owing to illness, Mr. R. P. Jones, of Cardiff, was unable to give his promised paper on "Residuals;" and Mr. W. T. Lane, also of Cardiff, consented at short notice to fill the breach.

OBSERVATIONS ON GAS COOKER TESTS.

By W. T. Lane, of Cardiff.

If we compare a present-day cooker with an old model, it is only in outer appearance that they resemble one another. There is an entire difference in the designs of the oven and the hotplate. The flue outlet of the modern cooker is at the bottom of the oven, instead of at the top. The object of this is to allow the heat to circulate throughout the whole of the oven. The circulation and utilization of the heat in this way tend to exclude cold air, and also reduce the gas consumption. Another improvement is the single-burner oven, though this is confined to one series of cookers. The main factor in favour of the single-burner oven is reduced gas consumption. Regarding this oven, the makers claim the following:

I. Complete circulation of the hot gases throughout the whole of the cooking space, and the avoidance of hot spots.
II. Uniform cooking with the oven fully loaded.
III. Reduced gas consumption
IV. Greatly increased oven capacity.
V. High quality of cooking.
VI. Elimination of possibility of smothering.

With regard to the two-burner oven, the makers claim:

I. The only bottom-flued oven which ensures that perfect distribution of heat only possible with two oven burners.
II. No browning shelf required.
III. Uniformity of temperature.
IV. Food can be baked and browned on the bottom shelf.
V. Saving of 25 p.ct. of gas consumed.

With regard to hotplates, great improvements are evident, especially in the construction of the bars and burners. The former have been designed to give a clear heating space to the utensils, and complete development of the flame, as against the old straight bars, where a large amount of heat was taken up by the bars themselves, and incomplete combustion occurred. With regard to the burners, there is a new "high-efficiency" type; but the old ring type is still used by some makers. From the results of tests, it will be observed that the ring burners give a creditable performance, and that from the point of view of gas consumption there is little to choose between the two types. The tests were based on the method set forth by the Institution of Gas Engineers—*i.e.*, determination of the normal maximum consumption, the factor of safety, the "temperature maintenance" consumption, and the suitability for cooking.

The test for the hotplate burners takes the form of an efficiency test. A certain quantity of water is heated in a saucepan, through a definite rise in temperature. The amount of gas required to bring about this rise in temperature is ascertained, and the result is calculated, in the form of a ratio, as B.Th.U. given out by the gas compared with B.Th.U. absorbed by the water. The efficiency can be easily calculated from this result. The apparatus is very simple, consisting of a saucepan and lid, the lid being fitted with thermometer and stirrer.

Two of the latest types of bottom-flue-outlet cookers were used, and two of the old type having the flue outlet in the usual position. The sizes of these cooker ovens were such as would give approximately uniform capacity.

The first cooker to be tested was one of the bottom-flue type with the oven fitted with thermostatic control. The capacity of the oven was 3720 cub.in., and it had a single burner. In all the maximum consumption tests to follow, three temperature readings were taken—one at the top, one at the bottom, and one in the centre.

Oven lighted	9·42 a.m.
400° Fahr. registered by centre thermometer at	9 55 ,,
Therefore time taken	13 mins.
Temperature of top	430° Fahr.
,, ,, bottom	320° ,,
Flue temperature	264° ,,
Consumption per hour	17 c.ft.
Pressure	20 tenths

It will be seen from this that the oven passes its test with a margin of one minute, which is, of course, satisfactory, but at the same time it appears that there is too great a difference between top and bottom temperatures (about 100° Fahr.).

In the "factor of safety" test, the burner had an increased pressure of four times that of the above—in other words, 80 tenths—which is very good. The flue analysis was:

CO_2, 5 p.ct.; O_2, 34·2 p.ct.; and CO, *nil*.

Bread-Baking Test.

[Four 1-lb. loaves used, as in all other tests.]

Oven lighted	9.55 a.m.
Bread put in	10.10 ,,
Gas shut	11.20 ,,
Time for bread baking	1 hour 10 mins.
Consumption	18 c.ft.

Loaves changed round 55 mins. after starting.

The resulting loaves on professional baker's examination proved satisfactory, except that he diagnosed that the oven was "rather on the dry side."

Hotplate burner efficiency test with the same cooker:

Quantity of water used	10 lbs.
C.V.	480 B.Th.U.
Pressure	20 tenths
Gas used	4·75 c.ft.
Temp. of cold water	65° Fahr.
,, hot water	190° ,,
Rise in temperature	125° ,,

B.Th.U. given out, 2280; B.Th.U. absorbed by water, 1250; efficiency, 55 p.ct.

The cooker next tested was by a different maker. It had two oven burners, flue outlet at the bottom, and hotplate fitted

with two " Ace " and one ring type burners. Capacity of oven, 3796 cub.in. Maximum consumption test:

Oven lighted	11·26 a.m.
400° Fahr. registered by centre thermometer at	11·37 "
Time taken	11 mins.
Temperature of top	428° Fahr.
" " bottom	408° "
" " flue	260° "
Consumption per hour	22·5 c ft.
Pressure	20 tenths.

It will be seen from the above that the makers' claim for uniformity of temperature throughout the oven is substantiated.

Flue analysis:

CO_2, 2 8 p ct.; O_2, 44 p.ct.; and CO, *nil.*

The factor of safety test was very satisfactory, as in the previous cooker. As previously stated, there is a controversy regarding the merits of the " Ace " and ring type burners; and as this cooker has both fitted, the opportunity was taken of testing their efficiencies.

—	"Ace."	Ring.
Water used, lbs.	10	10
Gas used, c.ft.	6·375	4·75
Temp. of cold water, ° Fahr.	64	66
" " hot water, ° Fahr.	189	191
Rise in temperature, ° Fahr.	125	125
Consumption per hour, c.ft.	18	18
Pressure	20 tenths	20 tenths
C.V.	465	471
B.Th.U. given out by gas.	2964	2234
B.Th.U. absorbed by water	1250	1250
Efficiency, p.ct.	42	56

It will be seen from the above that the ring burner has a higher efficiency.

With regard to the bread-baking test, we often read that the oven " will bake on every shelf " To substantiate this statement, a test was made. One of the loaves was placed on the bottom shelf, and three were placed on the centre shelf. The time taken for baking was rather long, being 1 hour 28 mins. for the top loaves, and 1 hour 38 mins. for the bottom loaf. The resulting bread was satisfactory, including the bottom loaf. This proves the makers' statement.

As the above tests were carried out on modern up-to-date cookers, it was decided to contrast them with the tests of older cookers with flue outlets at the tops of the ovens. The cookers tested were A and B, both of the ordinary pattern, made by different makers. B was the general pattern slot cooker. A was fitted with two oven burners, had the flue outlet at the top, and an oven capacity of 3712 cub.in. The hotplate burner was of the " Ace " pattern.

Maximum consumption test:

Oven lighted	10.35 a.m.
400° Fahr. registered by centre thermometer at	10·42 "
Time taken	7 mins.
Temperature of top	410° Fahr.
" " bottom	358° "
Flue temperature	185° "
Consumption per hour	21 c.ft.
Pressure	20 tenths

This oven was rather quick in heating up.

Flue analysis:

CO_2, 4 p.ct.; O_2, 25·6 p.ct.; and CO, *nil.*

In the " factor of safety " test this oven was unsatisfactory. Floating occurring at a pressure of 2½ times that of the previously-mentioned pressure. This can be substantiated, if one looks at the oxygen content of the flue analysis, which is low compared with previous analyses.

In the bread-baking test, the oven was again unsatisfactory; the resulting bread being burnt at the top and underdone at the bottom. The time was 1 hour 14 mins. The oven was subjected to the same conditions as all others. However, it passed a successful hotplate test, giving an efficiency of 52 p.ct.

Cooker B was fitted with two burners and had the flue outlet at the top. The hotplate was the same as on the former cooker.

Maximum consumption test:

Oven lighted	10.55 a.m.
400° Fahr. registered by centre thermometer at	11.03 "
Time taken	8 mins.
Temperature of top	420° Fahr.
" " bottom	366° "
Flue temperature	255° "
Consumption per hour	21 c.ft.

This again was satisfactory, though slightly on the quick side.

In the bread-baking test, a slight alteration was made on the suggestion of the examining baker, in the form of placing a sheet of asbestos in the centre of the oven, which tended to check the quick rising heat from the burners. Also, the drip tin was partly filled with water, allowing steam to pass through the oven, helping to keep the bread moist. The resulting bread proved very satisfactory, being baked in 55 minutes.

It will be seen from these tests that the new type of cooker is far more efficient than the older pattern. In construction and design the new models are far ahead of the older ones, and have such advantages as thermostatic oven control, and various other improvements. In summarizing these tests, one is faced with a problem which is always being put to us by consumers. Will the new type of cooker last as long as the old cast-iron type? The answer to this, undoubtedly, is an old one—" Time will tell."

In conclusion, I would like to remark upon semi-smooth and smooth-top hotplates. I think they are a decided improvement on the bar type. There are two reasons for this—first, that of utilizing and conserving some of the waste heat which escapes from the hotplate burner; secondly, cleanliness. The latter, from the consumer's point of view, is important.

In thanking Mr. Lane for his paper, Mr. C. S. THANE (Newport) called attention to the author's kindly action in coming forward at such short notice with such an interesting paper. This was seconded by Mr. C. B. FELTON (Newport). Messrs. B. J. BELL, F. H. OSBORNE, R. T. MILLS, A. P. LYONS, G. W. RANDELL, H. WILLIAMS, and K. JONES also spoke.

The Directors and management of the Cardiff Gas Light and Coke Company were thanked on the proposition of Mr. A. E. MARTIN (Merthyr Tydfil), seconded by Mr. C. B. FELTON (Newport).

PROTECTIVE COATINGS ON NATURAL GAS MAINS.

A company engaged upon a $20,000,000 natural gas distribution project have been conducting extensive tests upon a number of commercial coatings and paints, in order to determine their relative durability when applied as pipe coverings. The requirements are ability to withstand soil action and ground water, as well as perfect insulation against electricity. It is reported by the " Gas Age-Record " that the results indicated that for mild corrosive conditions an economic protective coating could be obtained, consisting of a cold priming coat, followed by a hot enamel. Both of these, the tests showed, should be coal tar products. The tests further indicated that for highly corrosive conditions the protective coating might well consist of three coats of coal tar pitch in which are embedded two layers of asbestos felt. The latter method is being used on parts of the pipeline the situation of which calls for a higher degree of protection. The priming solution used with the enamel coating is normally a liquid, and is applied cold, being spread over the entire surface of the thoroughly cleaned pipe with long-handled brushes. This primer, while it may have some value as a corrosion-preventing agent, is used chiefly as a bonding medium between the pipe and the enamel. The enamel, which is the real corrosion-resisting medium of this type of coating, presents a much more difficult problem of application. Under normal conditions the enamel is a solid, and must be heated to around 350° Fahr. before it becomes a free-flowing liquid. The molten enamel is poured on top of the pipe, and allowed to spread over the top and sides and to run to the bottom, where it is caught in a canvas sling so manipulated as to spread the coating over the under-side of the pipe. This type of coating requires about 55 gallons of primer and 9¼ tons of enamel per mile of 20-in. pipe. The coal tar pitch-asbestos felt or double wrap coating is applied much in the same manner, except that, after the primer and first coat of pitch are applied, and while the pitch is still hot, a layer of asbestos felt is placed around the pipe and embedded in hot pitch. The second coat of pitch is then put on, and a second layer of felt placed. This second layer of felt is so arranged as to stagger joints with the first layer, and is wired in place to prevent the felt from pulling away from the pitch. The second layer of felt is then covered thoroughly with the hot pitch, and allowed to cool, after which whitewash is applied in order to protect the coating from the sun's heat.

Colonial Gas Association, Ltd.—The Board of the Association have decided to make an issue of shares, which will be available in the first instance for application by shareholders. The issue consists of 54,291 8 p.ct. preference shares, and 108,582 ordinary shares, all of £1 each, and ranking respectively *pari passu* with the existing preference and ordinary shares of the Association. These shares are being issued at the premiums of 2s. per ordinary share and 1s. 6d. per preference share. The net premiums received, after deducting therefrom the expenses of this issue, will be credited to reserve fund. Applications, on the proper form, and signed by the applicant or attorney, must reach the office of the Company, accompanied by the amount payable on application, not later than 5 p.m. on March 12. The necessity for raising fresh capital was referred to by the Chairman at the recent meeting of the shareholders; and the proceeds of the issue will be used to meet the growing requirements of the Association's undertakings, including the enlargement of the services in many of the works recently amalgamated with the Association.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Officers and Salaries.

SIR,—I was very much surprised when reading the current issue of your excellent "JOURNAL" (Feb. 15) to find the position of Engineer and Manager of the Skipton Gas-Works advertised at such a low figure as £300 per annum with house, rates, fuel, and light. Coming immediately after another vacancy which has caused well-merited comment, one is led to the opinion that the responsibilities involved in undertakings which have an annual make of 147 millions are sadly underrated and little appreciated.

As a young man, keenly interested in my work in the industry, to which I have devoted many years of study, the present position is both discouraging and distressing.

I must say the Skipton vacancy attracted me until I saw the salary offered. Surely such a position with its responsibilities and various demands warrants a better figure than that offered; and one labours in hope that, as these managerial vacancies arise, they will be made more attractive to the ambitious whose watchword is "Forward."

It is recognized by all that the present-day life is much more exacting in its demands than at any time in the history of mankind; and though I appreciate that economies must be effected, I trust that Skipton will review the position again, and come forward to us younger men with an offer more in keeping with the position concerned.

A. G. N.

Feb. 20, 1928.

Beckers Self-Sealing Coke-Oven Door.

SIR,—On p. 408 of your issue for Feb. 15, there appears a statement that the Transporting Machinery and Engineering Company, Ltd., have recently obtained the sole license for the "Becker" self-sealing coke oven door. If, as seems probable, the Beckers self-sealing coke oven door is referred to, the paragraph in question has been written under a misapprehension of the circumstances, as we too hold a license (non-exclusive) from Mr. Arnold Beckers, the proprietor of the patents covering this invention, for the manufacture and sale of this door in the British Empire.

WOODALL-DUCKHAM (1920), LTD.,
G. HUTCHINS,
Secretary.

Allington House,
136, Victoria Street, S.W. 1,
Feb. 17, 1928.

[The door in question is the Beckers—not the Becker.—ED., "G. J."]

Radiation Ltd. and the Gas Industry.

SIR,—I, like many others, have been greatly impressed by the phenomenal success which has attended the six constituent firms now amalgamated as Radiation Ltd. during the last eight years—a success which has, without doubt, exceeded the anticipations of all those concerned, whether Managing Directors, shareholders, or their customers. The service agreements of the former (which are stated to have been legally entered into at the time of the amalgamation) were based on a datum figure, that the Managing Directors should receive an amount of 10 p.ct. of any increased profits which might accrue to Radiation over and above the peak profits which had ever been reached up to that time, 1920. This, in my opinion, was a reasonable, fair, and equitable agreement. The business has increased by leaps and bounds until the profits have more than doubled, to the great advantage of Managing Directors and shareholders alike. Notwithstanding, a section of the shareholders, spoon-fed by a dismissed servant of the Company, have banded themselves as a "Shareholders' Defence League," with the object of upsetting the service agreements of the ten whole-time Managing Directors. They desire to treat those agreements as mere "scraps of paper," forgetting that they themselves as shareholders have also largely benefited from the increased profits, which have been paid to them in increased dividends or as bonus shares. They are, in fact, trying to cut off their noses to spite their faces.

I, as an old gas engineer, and one who has bought and distributed the goods of all the constituent firms of Radiation for over forty years, to the great advantage of my customers, and no less to the undertaking of which I am in charge, feel that an agreement legally entered into should be legally performed. The sanctity of a contract violated usually casts an aspersion on someone; but in this case shareholders and the Managing Directors are partners. This being so, I cannot understand the mentality of a small section of the shareholders trying to pillory the Managing Directors for the success they made of the business of Radiation by their combined foresight, business acumen, inventive skill, and the wonderful research work performed in their well-equipped laboratories at Radiation House. This research work has resulted in the steadily increasing efficiency of the apparatus manufactured by them, through the more economical consumption of gas and the elimination, due to perfect combustion and ventilation, of the harmful effects, and has been of immense value to the gas industry, through the increasing demand for gas for use in these efficient and hygienic appliances for heating, cooking, and many other domestic and commercial purposes.

Success is a fine thing; and when it is won by the wisdom and skill exercised by managers of concerns, it should be appraised at its full value. I wonder how many of the malcontented shareholders would agree to forfeit any of the increased dividends they have received, or are about to receive, as the ten Managing Directors have done by consenting to take 42 p.ct. less of the commission legally due to them since Dec. 31, 1926, under their ten years' service agreements, which will expire at the end of next year. I think it a very magnanimous action, and I take my hat off to the Managers of Radiation, who have done so much for the gas industry, and at the same time have built up a magnificent business employing thousands of workpeople who are to have an opportunity of participating in the prosperity of the Company from the beginning of this year (a system of co-partnership would appear to me to have been of greater benefit to the officers and employees). The Directors of an undertaking who are doing so much for their employees, and for the industry they serve, deserve better treatment than to be pilloried by even a small section of misguided shareholders—or, indeed, by anyone else—when their only crime is that they have made a huge success of the enterprise they have captained. They are mostly well known in the gas industry; and I feel sure they will be congratulated on the result of the poll, through which the accounts and balance-sheet were adopted by a majority of 453,305 votes. It is to be hoped that the green-eyed monster of jealousy will now die a natural death, and the Directors will be allowed to press forward with the new gas fire Mr. Yates described as being a marked advance on anything hitherto available. While they are doing so well for their shareholders and themselves, they will not lose sight of the fact that the gas industry is looking to the time when Radiation will give it still more hygienic apparatus, at such prices as will bring gas fires and cookers into the homes of all classes of the community.

A GAS MANAGER.

Feb. 20, 1928.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Standing Orders applicable to the following Bills have been complied with: Barnet District Gas and Water, Blackpool Extension, Bournemouth Gas and Water, Dover Gas, Llandudno Urban District Council, London County Council (General Powers), Rotherham Corporation, South Metropolitan Gas, South Suburban Gas (Consolidation), Tottenham and District Gas, York Town and Blackwater Gas and Electricity, and Windermere Gas and Water.

Blackpool Extension Bill: Presented, and read the first time.

Bournemouth Gas and Water, Dover Gas, Tottenham and District Gas, and York Town and Blackwater Gas and Electricity Bills: Presented, read the first time, and referred to the Examiners.

Petitions.

Petitions have been deposited against the following Bills: Bournemouth Gas and Water, by the Central Association of Accountants, Ltd.; Dover Gas, by the Dover Corporation; Tottenham and District Gas, by the Middlesex County Council; York Town and Blackwater Gas and Electricity, by the Frimley Urban District Council.

The Cleethorpes Gas Company are petitioning against the Cleethorpes Urban District Council Bill; and the Sheffield Gas Company against the Sheffield Corporation Bill.

HOUSE OF COMMONS.

Progress of Bills.

Barnet District Gas and Water, South Metropolitan Gas, South Suburban Gas, and Windermere Gas and Water Bills: Read a second time, and referred to the Examiners.

London County Council (General Powers), and Rotherham Corporation Bills: Read a second time, and committed.

Llandudno Urban District Council Bill: Presented and read the first time.

Petitions.

Petitions have been deposited against the following Bills: Windermere Gas and Water, by the Central Association of Accountants, the London, Midland, and Scottish Railway, and the Windermere Urban District Council; South Metropolitan Gas, by the Woolwich Borough Council.

The Town of Dudley Gas Light Company are petitioners against the Dudley Corporation Bill. On behalf of the Gas Light and Coke Company, and the Hampton Court Gas Company, petitions have been deposited against the Middlesex and Surrey (Thames Bridges, &c.) Bill.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

ANNUAL ORDINARY MEETING.

The Annual Ordinary Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW, C.B.E. (the Chairman), presiding.

The CHAIRMAN, at the outset, expressed his regret that Mr. F. J. Bradfield (the General Manager and Secretary) was laid up, owing doubtless to the inclement weather, and was unable to be present at the meeting.

The CHIEF ENGINEER (Mr. A. E. Williams) then read the notice convening the meeting; and the Director's report and the statement of accounts were taken as read.

CHANGES ON THE BOARD.

The CHAIRMAN, on rising to move the adoption of the report and accounts, said: It is with very deep regret that we have had to report the loss the Company has sustained by the death of Sir Frederick Green. Sir Frederick was closely associated with shipping, being, as most of us are aware, Chairman for many years of the Orient Steamship Company. He was elected a Director of the Commercial Company in 1894, being Deputy-Chairman for the two years prior to his decease. Altogether he served on the Board of the Company for 33 years. He was a shrewd and experienced business man, as well as a charming colleague; and we miss his counsel very much indeed. You will have noticed by the report that, in conformity with the Acts of Parliament regulating the Company, Mr. Harold Godfrey Palmer has been elected to the vacant seat on the Board. Mr. Palmer is a young man, comparatively; but he possesses all the necessary experience and qualifications for the position. He was trained as an engineer, and he has been connected with the gas industry for many years. He is now the Deputy-Chairman of the British Gas Light Company, which controls several large undertakings in the Provinces. I may say that my colleagues and myself consider we have been fortunate in securing his services. It may be of interest to recall that in the year 1851 the Commercial Company—confirmed by the Act of 1852—acquired the works and area of supply of the British Gas Light Company in East London. I sometimes wonder whether they have ever regretted the sale.

THE COMPANY'S ACT.

The outstanding feature of the past year, in so far as it concerns the Company, was the success of the Company's application to Parliament. I will not go over the reasons which actuated the Directors in recommending the promotion of the Bill, as I dealt fully with that matter a year ago. There were a few petitions presented against the Bill; the principal one being that of the London County Council. I am glad to say, however, that, with the assistance of our Parliamentary Agent, Mr. Seager Berry, combined with a little "give and take" on both sides, difficulties were disposed of, the petitions were withdrawn, and the Bill passed through both Houses unopposed. You will realize, however, that the Company had to be prepared for a contest in the Committee Rooms; and the compilation of statements and the preparation of evidence imposed a strenuous task on the chief officers, of whose services I cannot speak too highly. I should also like to acknowledge the assistance and support given by our colleague Dr. Carpenter, who, as the pioneer of what is known as the basic price and dividend system, which we have adopted, was a tower of strength. ["Hear, hear."] If it were necessary to produce evidence of the advantage which the passing of the Act has been to the stockholders, one has only to mention the gradual and steady increase during the past year in the quotation of the Company's stocks. When the Bill was promoted in November, 1926, the market quotations were for the 4 p.ct. capital stock 78½ and for the 3½ p.ct. stock 75½. These stocks were merged under the Act, and are now described as ordinary stock; and the present market quotation is 98-100. I am told that "The Times" one day this week recorded a transaction at par. I am sure we are all glad to see Commercial stock back at that figure.

A PROSPEROUS YEAR FOR THE GAS INDUSTRY.

The past year has been a prosperous one for the gas industry. Notwithstanding the intensive propaganda of its (State-aided) competitor, electricity, the industry has held its own. Although it cannot be said that there was a definite trade recovery during the year, it is generally acknowledged that there was an improving tendency; and, as you will have gathered by the optimistic opinions expressed by the Chairmen of the five large Joint Stock Banks (the nature of whose business enables them to gauge the slightest variation in the trades and industries of the country), there is a prospect of a still further improvement in the current year. As you know, in our district in the East of London, we are particularly sensitive to trade variations.

With regard to the Commercial Company, it is gratifying to the Board to be able to report very satisfactory results. Although the coal stoppage terminated prior to the commencement of the period under review, the past year was not entirely free from its adverse effects. Contracts previously entered into for foreign coal had, in most cases, to be carried out; and, in fact, no cancellation was possible without payment of compensation. This coal, from its higher average price and inferior quality, naturally affected results; but, notwithstanding this, it has been possible to present to you accounts which justify an improvement in the dividend distribution. "It is an ill-wind that blows no good;" and I readily acknowledge that even the coal stoppage brought some good results. The public learnt to rely on gas heating, as well as gas cooking; and the gas fires fitted during the strike still remain, and are being used.

PRICE OF GAS.

To meet the heavy cost of foreign coal, the price of gas was, as you are aware, raised at the beginning of last year from 9·8d. to 10·4d. per therm. This was the highest price attributable to the coal stoppage. In July, a reduction was made to 9½d. per therm, and as from Christmas last to 9d. per therm. From the point of view of selling gas, the past year has been a somewhat abnormal one. Up to the end of August there was an increase in the output of 217,392 therms, or 1·63 p.ct. In the next three months, during which very high temperatures prevailed, there was a decrease of 140,531 therms, or 2·6 p.ct. The last month included two cold "snaps;" and there was an increase of over 4 p.ct. Taking the whole year, however, the sales, after correction for temperature and pressure, just exceeded those of the previous year; and we had a record sale of 19,832,765 therms. Analyzing these sales we find that:

Trade consumption (subject to discount) was 5·53 p.ct. increase on the figures of the previous year.

General consumption (subject to discount) was 2·5 p.ct. increase on the figures of the previous year.

Ordinary domestic consumption was 1·97 p ct. decrease on the figures of the previous year.

Prepayment consumption was 0·63 p.ct. increase on the figures of the previous year.

THE CO-PARTNERSHIP.

Before dealing with the accounts, there is one item in the report to which I must refer. You will notice that at the end of the paragraph recommending the dividend payment, it says that the present dividend for the year permits the allocation of the sum of £20,732 16s. to the employee co-partners. In explanation of this, I would remind you that the Company's Act of 1927 provides for a basic price for gas and for the sharing of the surplus profits between the consumers, the ordinary stockholders, and the employee co-partners. The saving of any sum to the consumers by reason of a reduction of the selling price for gas below the basic price of 11d. per therm, enables the Directors, after providing for the dividend at the basic rate on the ordinary stock, to divide equally between the stockholders and the employee co-partners a sum not exceeding one-third of such saving. The saving to the consumers, by reason of the gas being sold (at an average price) below the basic price of 11d. per therm, was equal to £148,647; and, in the Directors' opinion, the balance standing to the credit of the net revenue account permitted the distribution of an additional 1 p.ct. dividend, or £20,732 16s., and the allocation of a similar amount to the co-partners.

It is confidently anticipated that this statutory recognition of the triple co-partnership will strengthen the good relations existing between the Company and its employees, and, by increasing the interest of the employees, will secure greater economy in working, and thus redound to the benefit of the consumers and other co-partners. ["Hear, hear."] I have frequently referred to co-partnership, or, as it used to be described, profit-sharing, at these meetings: but I should like to reiterate that year by year I become more convinced that the success of the gas industry at the present time is largely due to the co-partnership movement, and this success has enabled the industry to do more for the co-partners than any other trade or industry. There is scarcely a meeting of the Directors at which, in one form or another, the advantage of the system to the employee is not illustrated. I believe all our employees have learnt what a blessing this system has been to them.

ACCOUNTS.

Now, if you will refer to the accounts, you will notice, in Account No. 3, that the capital expenditure has been increased by £21,160. This represents mainly the expenditure of £14,000 on freehold premises in the Whitechapel Road, purchased for the purpose of showrooms, £11,279 in respect of the new gasholder at Poplar, to which I referred last year, and £502 on prepayment installations. I may say that I think we have been somewhat backward in providing showrooms in our district. Now we have a very good one at the other end of the district; and we are looking forward to having an equally good one at Whitechapel. I believe we shall find it of great benefit in popularizing the use of gas. From the total of these three items named there were certain district credits, mainly depreciation charges, amounting to £4621. The additional expenditure naturally increases the debit balance on the account, which now amounts to £101,638; but you will appreciate that it is of advantage to the Company to borrow from our bankers, rather than to raise the amount by an issue of capital.

Coming next to the revenue accounts, I must remind you that they are scarcely comparable with those of the previous year, owing to the abnormal conditions under which we were then working on account of the strikes; but dealing only with the main items, I may perhaps usefully point out that coals and oil cost less by £102,272; but coke, breeze, and liquor realized £53,944 less. Tar, however, came to the rescue, and returned £14,361 more. Carbonizing wages were £3059 less; but the item of repairs and maintenance of plant was £30,103 more. Mains and services cost £4371 more, stoves £3228 more, prepayment meters and fittings £7776 more, co-partnership £11,371 more; while other variations account for an increase

of £4153. Thus the total expenditure (less residuals) was smaller by £4656. Gas receipts (by reason of the higher average price), rental, and sundries realized more by £25,891. Bank and other interest was more by £814, leaving a net gain on balance of £29,733.

The saving on the coal item is, of course, due to the high cost of foreign coal in the previous year. This would have been more, had we not had large arrears to take under contracts made prior to the coal stoppage. During the year additional contracts have been made for supplies of coal up to June, 1929, at reduced prices. A very satisfactory feature of present-day conditions is the increasing demand for coke. The average price realized in the past year —23s. 5·2d. per ton—was not, of course, so high as in 1926, when it was 31s. 6½d. per ton; but it compares favourably with the price obtained by our big neighbours, and the quantity sold, mostly in our own district, was a record in the history of the Company. Tar is also selling well; and the quantity of dehydrated tar sold for road purposes is increasing yearly. Sulphate of ammonia is not so good. The price is low, although there has been no difficulty in disposing of it. You will, however, be pleased to know that the Company's cost of production is less than that of other companies; and it is still profitable.

The large increase in the repairs to plant and district items is mainly due to a larger proportion than usual of renewals having been carried out during the year. I would add that, although the cost of repairs to works and plant may not be so heavy this year, I do not expect the district item to be lighter. As you will realize, the more appliances the Company has at rental, the heavier is the annual maintenance cost; and we do not find that consumers get more reasonable in their requirements.

The larger amount received for gas is, of course, due to the high price charged during the first half of the year. The amount receivable during the current year, at the gross price of 9d. per therm, will be much less. The price charged last year was 10⅝d. per therm for the first six months, and 9½d. per therm for the second six months. One farthing a therm equals approximately £20,000; so that the saving to the consumer this year will, without reckoning the possibility of a further reduction, be over £70,000. That, of course, will enable us, if funds permit, to appropriate a proportionate amount for the shareholders and the co-partners.

The excellent working results are very satisfactory, and reflect great credit on the Chief Engineer, Mr. A. E. Williams, and his assistants. The coal gas made was 89½ p.ct. of the total; and it will be seen that the coal carbonized amounted to 276,016 tons, which is a record in the history of the Company. The carburetted water gas made was the lowest in percentage (10½) since such gas was first manufactured 30 years ago; and the small make is partly due to the high price of oil. With regard to the residuals, the following figures will be of interest:

Coal gas produced per ton of coal	.	.	.	.	72·49 therms
Coke made for sale per ton of coal was	.	.	.	.	11·53 cwt.
Coke and pan breeze	,,	,,	,,	.	1·50 ,,
Tar	,,	,,	,,	.	9·90 galls.
Liquor	,,	,,	,,	.	37·27 ,,

Those of us who have a knowledge of gas affairs will know that these working results, taken on the whole, have rarely been exceeded, and will appreciate that we, on this side of the table, are justly proud of the outcome of our officers' work.

Since the introduction of the Gas Regulation Act, the Company has been supplying gas of a calorific value of 475 B.Th.U. per c.ft.; but, after careful consideration, it was decided as from Sept. 27 last, to increase the declared calorific value to 500 B.Th.U. per c.ft.

There is very little more to which I need draw your attention. You will see, on Account No. 5, that the balance standing to the credit of the net revenue account, after providing for the co-partnership bonus, is £125,909 9s. 11d. The final dividend recommended amounts to £72,564 16s.; leaving £53,344 13s. 11d. to be carried forward to the current year, which is £14,443 4s. 6d. more than was brought into the account at the beginning of the year.

You will have noticed that a resolution is to be submitted later in the proceedings to increase the remuneration of the Auditors. I feel sure that you will approve the proposal, when I tell you that the fee at present payable to each Auditor (£50 per annum) was fixed as long ago as the year 1875. The gas sales in that year totalled 1060 million c.ft., as compared with 4118 million c.ft. at the present time: so that you will appreciate we are justified in recommending the increase of the fee payable to £100 for each Auditor, and I feel confident in leaving the decision in your hands.

TRIBUTE TO THE STAFF.

I cannot conclude my remarks without paying a tribute to the zeal and efficiency of the staff of the Company. The thanks of the proprietors are due to all ranks and employees of the concern; for the results which we place before you to-day could not have been achieved unless all had given their best service. But, while all are deserving, the highest meed of praise must be given to those who have the greatest measure of responsibility resting upon them. I cannot speak too warmly of the zeal and ability with which Mr. Bradfield handles the business of the Company. He combines tact with enthusiasm, and tempers his zeal with knowledge and discretion. His services rendered while the Company's Bill was in course of preparation and before Parliament were invaluable; and he gives to all who work under him a high example of efficiency and keenness. In Mr. Williams we have a Chief Engineer in whose professional knowledge and skill we place the greatest confidence. I speak in the presence of my colleagues who are better qualified to judge than I am; but I know what their opinion is, and I am glad to express it to you. I am proud —justly proud—after an experience of nearly 40 years on the Board of the Company, of the staff who serve it; and most of all do I count myself fortunate to be associated with two such able officers as Mr. Bradfield and Mr. Williams. [Applause.]

I now beg to move the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. H. W. Gell, O.B.E.), in seconding the resolution, remarked that, occupying, as he did, the position which had been held by their late highly valued colleague, he would like to add his tribute to the memory of the late Sir Frederick Green, and to endorse to the full the well-chosen and expressive words which the Chairman had used in alluding to him. The Board had lost a wise and experienced colleague, and not only that, but one whose character and personality commanded the highest regard of all who came in contact with him. With regard to the operations of the Company during the past year, there was nothing very much for him to add to the lucid and attractive address which the Chairman had just given them. He had summed up concisely, but exhaustively, the work of the past twelve months; and the shareholders had every reason to be satisfied with the report. He would like to refer briefly to the sentence in the report which mentioned the employee co-partners. This was unique. It was the first appearance in the reports of the Company of that body of co-partners as a recognized statutory section of the organization of the Commercial Gas Company, with a definite recognized claim on the surplus profits which were made. This marked a highly interesting milestone in the history of the Company. It had been a very great satisfaction to the Board to have Dr. Carpenter assisting them and sharing with them in the realization of that scheme which he had done so much to elaborate in the greater kindred organization in another part of the Metropolis over which he was the presiding genius.

The resolution was carried unanimously, without discussion.

THE DIVIDEND.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, it was resolved:

> "That pursuant to the recommendation of the Board of Directors, a final dividend be declared for the half-year ended Dec. 31, 1927, at the rate of 7 p.ct. per annum on the ordinary stock of the Company, less income-tax, making, with the interim dividend of 5 p.ct. per annum, less income-tax, paid for the June half-year, 6 p.ct. for the year, payable on the 17th of February, and that warrants for the same be forwarded by post to the proprietors."

RE-ELECTIONS AND AUDITORS' FEES.

The CHAIRMAN next proposed the re-election of the retiring Directors (Mr. H. W. Gell, O.B.E., and Mr. A. M. Paddon, M.Inst.C.E.). All present, he said, knew as well as he himself did what the services of these gentlemen were, and in what high esteem they were held.

Lord MARSHALL, P.C., K.C.V.O., in seconding, remarked that eulogy of one's colleagues in their presence was always difficult; but he knew he was voicing the sentiments of all on that side of the table when he said that these two gentlemen were always zealous in every way in forwarding the interests of the Company.

The motion was agreed to; and Mr. GELL and Mr. PADDON briefly acknowledged their re-election.

On the proposition of Mr. FLETCHER, seconded by Mr. O. C. HILLS, the retiring Auditor (Mr. S. W. Savage) was re-appointed.

The CHAIRMAN moved that, pursuant to the powers contained in section 27 (*b*) of the Commercial Gas Act, 1927, the remuneration of each Auditor be increased to £100 per annum.

Mr. STANLEY H. JONES seconded this; and it was unanimously agreed to.

Mr. G. W. ILSLEY, returning thanks on behalf of the Auditors, remarked that it was through no fault of the Board that this suggestion had not been brought forward before; for until the last Act was passed, it had been impossible for them to do so.

VOTES OF THANKS.

Mr. STANLEY H. JONES proposed a hearty vote of thanks to the staff and employees generally. Mr. Bradfield, he said, was absolutely indefatigable—always striving for improvement. The accounts now presented were a tremendous tribute to him and to his excellent colleague—his (the speaker's) father's old pupil—Mr. Williams. The work of both, he hoped, would be reflected in the accounts for many a long day to come. As for the remainder of the staff, all were rendering their meed of service, and were deserving of hearty thanks. Then there were the great body of workmen, who performed their various tasks efficiently, and were real good fellows. The Commercial men were, if he might say so, by tradition loyal to the Company; and it was a great re-assurance to the shareholders to know that they carried on their work quietly, and were undeterred by outside influences from doing their duty.

Mr. A. M. PADDON seconded the vote, pointing out that the results revealed by the accounts had not been achieved without the expenditure of the maximum amount of energy and skill. Therefore they owed a very hearty vote of thanks to all concerned.

The resolution was passed with great cordiality, and acknowledged by Mr. WILLIAMS.

The proceedings were brought to a close by a vote of thanks to the Chairman and Directors, which was accorded on the proposition of Mr. FRANK JONES, seconded by Mr. ILSLEY.

Prices and Profits at Glasgow.—It is stated that the price of gas in Glasgow is to be reduced at an early date from 4s. 3d. to 3s. 11d. per 1000 c.ft.. The new price is likely to come into force in April or May. During the half year ended Nov. 30, 1927, the Department made a profit of £269,244; and at a Sub-Committee meeting last week, the Engineer (Mr. J. W. McLusky) said that, if the present price were continued until the end of the current year, it would be possible to wipe off at least half of the loss of £1,000,000 which had accumulated owing to the coal dispute of 1926. The Committee, however, felt that it would be in the best interests of the Department to effect a reduction of 4d. per 1000 c.ft.

SOUTH SUBURBAN GAS COMPANY.

Annual Ordinary Meeting.

The Annual Ordinary Meeting of the proprietors of the South Suburban Gas Company was held at the Cannon Street Hotel, E.C., on Friday, Feb. 17—Dr. C. CARPENTER (the Chairman) presiding.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting.

The minutes of the last annual ordinary meeting were taken as read, and the Chairman sealed the register of proprietors.

The CHAIRMAN, moving the adoption of the Directors' report and the accounts for the year ended Dec. 31, 1927, said: Our business to-day consists of two parts. The first pertains to our ordinary affairs, such as our working results and the growth and development of our business; the second refers to extraordinary matters—namely, the codification of our many Acts and Orders and the modernization of our financial basis.

Now in regard to our gas business, I am glad to be able to say that its progress has been satisfactory. We have not only increased the number of our consumers, but we have increased our sales of gas. The amounts of these increases appear in the report which has been circulated, and must, I think, be regarded with satisfaction. It must not be overlooked that gas-consuming apparatus has been for some years past continually improved in design, especially that used for cooking and heating purposes. The rentals received during the year in respect of stoves and fires alone was £46,121. We are continually not only improving ourselves, but purchasing improved apparatus, and year by year displacing a proportion of the older varieties, so that gas is to-day less and less wastefully used. This will, of course, strengthen our business, because, as competition increases and becomes more exacting, we are becoming in a better position to deal with it.

Competition has become more organized, and money is being freely spent not only in advertising the merits of other forms of lighting our homes, but in advocating liquid fuel—and, indeed, an increasing use of coal—for warming them and for the cooking of our food. No doubt you have seen the announcements that have been made, that the people who have coal to sell have decided to work a very intensive propaganda in order to popularize what they call the use of coal fires. Notwithstanding this, the demand for gas ranges and fires continues exceptionally good, and in itself provides a very valuable indication of the progress being made in our business. Now this progress has been effected in face of the high charge it has been necessary to make for gas during the past year. I might truly say that the first paragraph of the report contains the most satisfactory item in the whole of it—namely, that the price of gas has been reduced not merely to its pre-coal-strike level, but appreciably below it. Gas is at once a necessity and a luxury. We need its extended use under both headings. A large proportion of our consumers are slot meter consumers, taking their gas through prepayment meters, and a large number of them are ordinary consumers who take their gas in the ordinary way, so that gas is, as I have said, at once a necessity and a luxury. The figures set out in the revenue account—ranging from 12¾d. down to 10d. per therm—cannot be looked upon as being "popular prices;" but we hope in twelve months' time to have a better story to tell you, based upon improved working.

Turning now to the statement of accounts, the cost of coal, &c., shown in the first item on the revenue debit side is £82,735 less than for the previous year; the reduction being mainly due to the effect of the coal strike upon the prices of coal in the latter half of 1926 and the first few weeks of 1927. The expenditure upon maintenance and repairs of works and plant has been heavy, having reached a figure of £181,627. I am not sure whether it is the highest in our history, but it is an exceedingly high one. It has been due mostly to two or three replacements of obsolete apparatus. We had a considerable replacement of carbonizing plant at Dartford. This had to be delayed, perhaps, longer than it would have been in ordinary circumstances, because even to-day there is not unanimity of feeling and knowledge with regard to the best form of carbonizing apparatus. Despite all that has happened in the last few years, carbonization is not a definitely accepted process in the minds of those responsible for this work. However, the time came when the replacement had to be carried out; and it is one of the items responsible for the high figure set out here. Then it was necessary to bring our coal-handling plant at our large works at Sydenham up-to-date. The coal-handling machinery in a works where coal is the raw material, and the all-important one, is of great importance, and goes on for a long time doing useful work; but the time comes when it, too, becomes obsolete, because in coal-handling matters there is continual improvement and change going on. Considerable alteration of the coal-handling arrangements was carried out at our Sydenham Works. Another item is the increase in the machinery for handling coke. With regard to coke, the income from it has been very well maintained, and the demand for coke of definite physical sizes has shown us that we must do much more in the way of providing machinery for producing these various grades and for storing them so that they are available from time to time for the consumers. In other words, I think we have got to get into a somewhat similar position that we occupy to-day with regard to gas. Whatever happens with regard to gas supply, the consumer knows that he has only to turn it on in order to get his service. I am afraid coke has been looked upon rather too much in the nature of a bye-product; but there are times when the consumer realizes what great value it is for him, and he expects to be served within two or three days of his requisition. Therefore, we have to put our sale of coke machinery into somewhat the same position as our sale of gas machinery is to-day. There is only one other matter to which I need refer in regard to this particular item of expenditure. This is that we have acquired five acres of land at Worsley Bridge Road which are being laid out as a sports ground for the use of our employees, who, I may say, continue to show their firm adherence to co-partnership principles.

The other items on the debit side of the account are normal. On the credit side, the receipts from the sale of gas show an increase of £35,000; this difference being partly due to the larger quantity of gas sold—this is very important, and we are most satisfied with it, as indicated in our report—and partly to additions in the price of gas necessitated by the coal stoppage. You will understand that we had to pay very high prices for the coal we had to substitute for that which we could not obtain from our own country; and the price of gas had to follow as a matter of course.

The income from coke has been well maintained, and the demand for graded coke during the year has at times been beyond the Company's ability to meet it. The erection of an additional unit of grading and screening plant is now nearing completion, and it is anticipated that with it any demand for screened coke will be fully met. There is no doubt that the public are recognizing to an increasing extent the value of coke as a solid fuel for water-heating boilers and in properly constructed open grates, and the extension of our business in this direction will undoubtedly depend on our efforts suitably to meet their requirements. Its successful use, however, for these purposes is dependent largely upon the availability of coke graded to sizes best suited to particular requirements; and no effort is being spared, not only to foster and extend this, but to ensure that customers are supplied with the various sizes required to yield the best results. We have in the past seen to it that the various showrooms we have in the various parts of our very large district are provided with the most up-to-date apparatus for burning gas economically, for our future depends, in the face of the increasing competition, not only upon cheap gas, but on the use of apparatus best suited to use it economically.

THE POSITION OF TAR AND AMMONIA.

The next important residual product is tar, and this has brought us in no less a sum than £58,299. This has been very satisfactory, and has helped us very much in making up the sheet we are just discussing; but we have reached our peak, and I think we are on the down grade with regard to tar prices. The value of tar depends upon two important uses. One is its use on the roads; and its use there is governed largely by the price of its competitor, bitumen. The other factor is the value of pitch, which is a very large constituent of it; and the value of pitch depends upon its use mainly in patent fuels. It is used chiefly as a binder for enabling the dust coal, principally from the steam coal and anthracite produced in South Wales, and also in those parts of the Continent of Europe which have a poor quality coal for industrial purposes to be utilized. You will understand, therefore, that as the price of coal has been falling, so the price of the material required to utilize the fine coal, whether in South Wales, or in Belgium, or the north of France, must fall in sympathy with it. With regard to the use of tar on roads, I am glad to say that there it is maintaining its hold and its use. The increasing value of tar on roads is in accordance with the improved quality which the gas-works in the different parts of the country are producing. In the beginning the crude tar was used; but from time to time certain defects arose with regard to its composition, and our task to-day is to produce a tar which is more and more suitable for road use.

Ammonia has been the most unsatisfactory of our distillation products. You will see from the revenue account that sulphate and ammoniacal liquor, less acid and labour, have brought us in only £4078. There was a time when ammonia was one of our most valuable residuals, but I am afraid that that time has gone for good and all. We have now to meet the enormous competition of synthetic sulphate, not especially that produced in Germany, but the increasing quantity also that is being produced by the synthetic works in the north of England. The amount received is exceedingly small, having regard to the large cost of the plant that has been put down at one time and another to deal with ammonia. The outlook is very unpromising.

NEW CAPITAL.

The normal annual expenditure of new capital to meet the steadily increasing development of the Company's business, and to pay off the considerable sum on loan from the Company's bankers, renders it necessary that a fresh issue of capital should be made in the near future. The result of the last issue was unfortunately adversely affected by the period of the General Strike in 1926; and it is curious that that catastrophe coincided almost to a day with the period during which tenders for the new issue were receivable. If the Bill to be discussed at the extraordinary meeting (to follow this meeting) becomes law, relief will have been obtained from some of the antiquated regulations pertaining to the raising of money by gas undertakings and by which their operations in the past have been unduly hampered.

Considerable assistance will be effected, too, by our association with the South Metropolitan Gas Company, since by it capital expenditure will not be required by us for manufacturing plant. We shall be relieved of the necessity for raising more capital for gas manufacturing plant, and shall be able to use all our resources to meet the increasing demands made for distributing and gas-using plant. As stated in the report, this agreement, which was sanctioned by you a year ago, received the approval of the Board of Trade in April last. In accordance therewith, an offer to exchange 6 p.ct. irredeemable preference stock of the South Metropolitan Gas Com-

pany was dispatched to all holders of this Company's ordinary stock, and within a week of that date applications for exchange had been received in respect of the full £500,000 offered.

The Directors who vacated their office under the provisions of the agreement were my predecessor in the chair, Sir J. Fortescue Flannery, who found himself unable to continue to give the necessary time to the affairs of the Company; Mr. Alexander Dickson, since deceased; and Lieut.-Col. Boraston—all three, it is interesting to state, being firm advocates of the co-partnership principle to industry as applied and worked by us.

In this connection I must make special reference to Mr. William G. Waller, who retired last September under the Superannuation Scheme. Mr. Waller had been in the continuous service of the Company for about thirty-five years, and was the first employee elected to a seat on the Board as an employee Director, a position he occupied without a break from November, 1905. He was largely responsible for the success in its early stages of the new departure in company management, and was respected by his colleagues on this Board no less than by the employees of the Company who worked under him. I think that much of the success of that very new and far-reaching departure was due to his admirable conception of the position to which he was newly appointed all those years ago.

The figures I have given are the salient figures of the report. They give you a fairly good picture of the happenings of the past year, and I do not think I need trouble you any more with regard to the accounts themselves. I now move:

> "That the report of the Directors, and the accounts examined and signed by the Auditors, be received, adopted, and the report entered upon the minutes."

Mr. BENJAMIN R. GREEN (Deputy-Chairman) seconded.
The report and accounts were adopted without discussion.

THE DIVIDEND.

The CHAIRMAN moved:

> "That a dividend for the half-year ended Dec. 31 last be declared at 6½ p.ct. per annum, less income-tax, on the ordinary stock, and that warrants for the net amounts be forwarded on the 1st prox. to the registered addresses of the proprietors."

Mr. GREEN seconded, and the resolution was carried.

RE-ELECTIONS.

Mr. HAROLD GUNDRY moved that Dr. Charles Carpenter and Mr. Frank Harding Jones, out-going Directors, be re-elected Directors of the Company. Neither of these gentlemen, he said, required any introduction or any praise from him, because their merits were well known not only to the proprietors of the Company but to the whole gas industry. It would be impossible to find two gentlemen more suitable and more efficient as Directors of the Company. It was with great pleasure, therefore, that he proposed their re-election.

Mr. A. M. PADDON, seconding, said that the meeting perhaps marked the point of some new departure in the conduct of this great undertaking; and it has occurred to him that if this meeting were absolutely the first meeting of a new suburban enterprise of this kind, and if by virtue of that fact those present had to select two gentlemen as leaders, he was perfectly certain that the two names which would immediately suggest themselves for such prospective leadership would be those of Dr. Carpenter and Mr. Jones, by reason of their great abilities, their great experience, and their great responsibilities in such duties. Therefore, he had pleasure in seconding the proposal, which he was perfectly certain the proprietors would all endorse, in their own interests.

The proposal was carried unanimously, amid applause.

The CHAIRMAN, returning thanks for his re-election, said it was nearly twenty years since, at the suggestion of Sir George Livesey, he had become more closely interested in the Company than he had been hitherto, and it was but a short time afterwards that, owing to the unexpected decease of Sir George, the proprietors had been good enough to elect him to the Board. He had tried to do his best for the Company, and he hoped that he would be able to continue to serve the Company in the more important position he now occupied.

Mr. JONES also expressed his thanks.

On the motion of Mr. A. DIXON, seconded by Mr. A. J. KINGDON, Mr. Alfred Morland was re-elected an Auditor of the Company.

Mr. MORLAND expressed thanks for his re-election.

This concluded the business of the Annual Ordinary Meeting.

EXTRAORDINARY GENERAL MEETING.

An Extraordinary Meeting was then held for the purpose of approving the provisions of the Company's Bill, now before Parliament, the purposes of which are to consolidate the Company's Acts, to make new provisions as to the charges for gas supplied and the application of profits, to extend the limits of supply, to authorize the acquisition of additional lands, and for other purposes.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting.

The CHAIRMAN (explaining the provisions of the Bill and the reasons for them) said: You all know as well as I do that we carry on our business by virtue of authority given to us by Acts of Parliament or equivalent Orders, and it is a fact that to-day we carry on our business by virtue of something like 28 different Orders of all kinds. They pertain not only to the original Crystal Palace Company, but also to the various other companies with whom we have from time to time amalgamated; and one of the objects of this Bill is to consolidate into one the various Orders which from time to time we have obtained. It would not be fair if I asked you to accept this without description. We, as a Board, have gone carefully through its provisions, and they have, in more senses than one, been the subject of careful negotiations. Despite this, however, I think you are entitled to know fully what its provisions are; and, therefore, I propose to run through them from the beginning, not in great detail, but sufficiently fully to make you conversant with them.

In addition to the consolidation of our Acts and Orders, the Bill aims at putting right one very great injustice under which we and other companies have been for some time past labouring. You and I certainly will never forget what happened during the war, when it seemed that of all people the gas industry, which played so important a part therein, was singled out for a reduction of dividends on its capital differently from any other industry or any undertaking in the community. Despite the enormous value of the work done by the gas industry, the fact does remain that its dividends went lower and lower as the war went on, due to causes over which the industry had not the slightest control. Those circumstances opened our eyes to one of the great defects of the system under which we were then working; and in 1920 the matter came before Parliament in the form of a Bill promoted by another undertaking, which aimed at setting the industry on a fairer and sounder basis. The proposals of that Bill were adopted by Parliament. They have worked exceedingly well so far as they have gone, and we are by this Bill asking Parliament to grant this undertaking—which is certainly as much entitled to it as any that have gone before—similar privileges. Let me read what the preamble of the Bill says in regard to them. It says: "Whereas Parliament has in the past in certain cases made provision for securing that the public and those employed in gas undertakings and those providing the capital therefor" (you see, there are the three parties—the public who are taking gas from the undertakings, those employed in the undertakings, and those providing the capital for them) "should be more directly and mutually interested in the good management and prosperity of the undertakings, and such provision has been found to be of public advantage, and to conduce to the cheapening of the price at which the public can be supplied with gas." Those suggestions are not new; you have had them before in a somewhat different form, but Parliament, in 1920—we recite here what Parliament did then—came to the conclusion that further steps should be taken in that direction. The preamble goes on to say: "Whereas the Company are desirous, and it is expedient that such provision as aforesaid should be made applicable to the Company, and that the profits of their undertaking, after providing for a reasonable return on capital" (and this is the important part of it; for the first time it includes a suggestion that capital is entitled to a reasonable return. Capital did not have a reasonable return during the war, but Parliament is now convinced that capital should have a reasonable return) "should be applied as to the greater part thereof in reduction of the price of gas and as to the balance thereof in part in increasing returns on capital invested in their undertaking, and in other part in increasing the financial interest by way of bonus of employee co-partners of the Company." That again puts forward the suggestion with which you have been familiar for very many years—that the greatest possible encouragement shall be given to the undertaking to sell gas at the lowest possible price. The increased profit is to be applied as to the greater part thereof in reduction of the price of gas. This is the view of Parliament, and it is our view; because only by such a procedure shall we be able to maintain the stability of our undertaking.

THE BILL.

Then we come to the Bill itself. We have to incorporate certain general Acts; but there is nothing to say in regard to those. Clause 3 interprets various things that are mentioned in the Act—it is a clause of definition. Clause 4 defines the limits of supply, and the next few clauses recite various Acts and saving clauses which are included in the Bill. There are certain repeals and certain saving clauses. Clause 10 recites the purposes for which the Company exists—*i.e.*, it is for the purpose of manufacturing gas, and so on. Clauses 11 and 12 and subsequent clauses deal with the capital borrowing powers of the Company. The first important matter that arises is one which arose out of the last trouble during the coal strike to which I have referred, when we were so unfortunate with regard to the issue of our stock. It has been the custom, under previous Acts of Parliament, for us to give 28 days' notice of our intention to issue stock. We are asking Parliament, by this Bill, for that period to be reduced to 14 days; so that instead of having to give notice a month ahead of what we propose to do—a very unreasonable position, and one which applies, I think, almost wholly with regard to gas stocks—the period will be reduced, if the Bill is accepted, to 14 days, which is a period we can accept without inconvenience. The clause in question goes on to the general conditions with regard to issue; and there is no essential change in that. Then there are other clauses dealing with borrowing on mortgage, debentures, and mortgages, and redeemable stock. Then stamp duties are dealt with, and it is also made clear that stamp duties are not payable in respect of stock which may be exchanged for the temporary stock which we have issued.

Then we get to one of the essentials of the Bill; and it is this: We supply gas to-day on what is known as the heat basis. That was settled by Parliament in two Bills—one a private Bill and one a public Bill—in 1920. In order to apply the provisions to our particular requirements we shall be no longer under the provisions of the general Bill in respect of the heat basis of supply, but we shall incorporate particular provisions of that Bill in our own private Bill. The heat basis of supply has been explained, I think, on more than one occasion. It is, as you know, that heat, and not light, is taken as the basis of our charge. The Bill sets out the method by which the heating power is ascertained; it includes the provisions by which the Company are to give notice from time to time of what the heat value is; it includes the requirements of the Company to adjust the consumers' appliances if from time to time the Company vary the standard of the gas they supply; it lays down certain conditions with regard to pressure; it lays down conditions with regard to the appointment of gas examiners; and then it comes to this important question of price. Under the powers for which this Bill asks, the price of gas will be dealt with differently from what has been the custom. Parliament has laid down the provision that the capital

is entitled to its return, and Parliament has over and over again laid down that the public are entitled to gas at the lowest possible price. What it is proposed to do under this Bill is to fix a basic price for gas, and the basic price for gas is the one up to which the Company's obligations in respect of capital are ear-marked at 5½ p.ct. Whatever the conditions may be with regard to carrying on its business, whatever the changes which may happen with regard to the price of coal, or other values, Parliament provides that the Company shall be entitled to charge such a price as will enable it to pay 5½ p.ct.; so that we shall never again be face to face with those difficulties which happened so unfortunately during the war, and which might again arise in the future. Parliament has said that we are entitled, as capitalists, to a fair return on our money; and in order to settle that, Parliament has included a provision for a basic price for gas. If, by improved methods of working, or perhaps a fortunate turn of the market, we are able to sell gas at a lower price than 11d. per therm, Parliament says: "By how much has your revenue been increased as the result of the difference between selling gas at 11d. (the basic price) and the particular figure at which it is sold to-day?" and Parliament has laid down that that difference whatever it is, shall be divided so that three-quarters of it shall be paid to the consumer by way of reducing the price of gas, and the remaining one-quarter is divisible equally between the shareholders and the employed labour. Clause 36 says: "The surplus profits of the Company shall be divided in the following proportions, namely, three-fourths to the consumers, and one-fourth equally between the ordinary stockholders and the employee co-partners of the Company, in accordance with the following provisions," and then it sets out the machinery which has been provided for that purpose.

Then there is provision for a special price in certain districts. You will remember that when the various amalgamating schemes were discussed there was an arrangement by which higher prices were chargeable in certain areas than in others, and that year by year those extra charges were reduced until they disappeared altogether. They have now disappeared in every case except the Urban Districts of Bexley, Crayford, and Erith; and the Bill provides that in those respective areas the basic price of gas shall be taken as ½d. per therm more than the 11d. which relates to the whole of the remainder of the district. That goes on until 1929, when in those cases, too, the basic price of 11d. prevails.

Clause 39 is a saving clause in respect of discounts, and clause 40 deals with interim dividends. The basis of the working of this new Act (when it becomes an Act) is that we shall take the year's accounts for ascertaining the working of the Company as a whole. Instead of the half-yearly periods which in times gone by have been the basis, the arrangement under the new Bill will be that the whole year will be taken, and that, in order to meet the difficulty with regard to the payment of interim dividends, those dividends will be at the standard rate—the rate which Parliament will, we hope, authorize shall be paid in all circumstances as the basic figure. So the Directors will be authorized to declare interim dividends as high as, but not exceeding, that basic rate; and after making up the annual accounts they can say what are the total profits divisible in the way described, of which three-quarters is to go to the consumers and the other one-quarter to be divided equally between the shareholders and the employees.

Clause 41 deals with the transfer books. Clause 43, dealing with the promotion of a future Bill, is an important one. One of the difficulties under which we have been labouring is the uncertainty that from time to time our financial basis may be attacked; the local authorities may come forward and say that our price of gas is too high, or the standard is too high, and that it ought to be reduced. Then the machinery is set going by which an inquiry is held at the Board of Trade, the pros and cons are put forward, lawyers appear on behalf of both sides, the whole matter is discussed, and finally one of the officials of the Board of Trade gives his decision. Well, that is not the way to carry on successfully a great industry such as this. It is much too complicated to carry on with disturbances which may arise from time to time, like unexpected squalls; and what this Bill does is to allow us to go on for five years, during which period we shall pursue our course undisturbed, and at the end of that period we have to give an account of our stewardship. That has been done in one other case; and Parliament in that instance said: "You have carried out your obligations, we think your scheme has worked exceedingly well, and you can go on now for another ten years." That is what we hope will happen in our case; but as a preliminary the period of freedom which we shall have in order to work out these proposals will be five years for certain.

Then there are clauses dealing with the reserve fund and the special purposes fund; but I need not deal with the latter, because it already exists. There are clauses referring to the payment of pensions, and regulations referring to meetings, and then there is a clause with regard to directors. Most of the regulations with regard to directors are confirmed; but here is an important one which I must mention, and which I think I ought to read. It deals with the appointment of a managing director or managing directors, and reads:

> "(1) The directors may appoint one or more of their body to be managing director or managing directors either for a fixed term or without any limitation as to time, and may remove or dismiss him from office and appoint another or others in his or their place or places.
>
> "(2) A managing director shall not, while holding that office, be subject to retirement by rotation, and shall not be taken into account in determining the rotation of retirement of directors; but if he ceases to hold the office of director from any other cause he shall *ipso facto* immediately cease to be a managing director.
>
> "(3) The remuneration of a managing director shall from time to time be fixed by the directors and may be by way of salary or commission or participation in profits or by any or all of those modes.
>
> "(4) The directors may entrust to and confer upon any managing director such of the powers exercisable by the directors and subject to such conditions as they may think fit and may from time to time revoke, withdraw, alter, or vary all or some of such powers."

That is a clause which is included in all modern Acts, and for that reason it is included in this one.

Then we have clauses dealing with maintenance of gas-works, conditions of supply in undedicated streets, and giving the Company authority to specify fittings. One of the troubles we suffer from is the use of unsuitable gas fittings and apparatus, and this Bill proposes to give us the authority to specify what they should be. It is common in some companies to-day, and the whole of the electrical industry has been built up upon specified requirements of this kind.

Further clauses deal with the provision of valves for high-pressure air or gas, the period of error in meters, stand-by supply, and other matters with regard to supply. Another clause deals with power gas, and reconstitutes powers we have already, and of which I hope we shall make more use in the future. Then there are regulations with regard to its use, and we have some provisions for the protection of the County Councils and local authorities, and the Metropolitan Water Board. Other clauses deal with mutual agreement, patents, supply of gas in bulk, an agreement with regard to coal loading, serving of consumers with notices, the recovery of demands, and the costs of the Act.

Then there are schedules which recite the various areas; but they are merely formal. There is a schedule which refers to the 28 Acts and Orders I spoke of as relating to the Company, and then there is one dealing with co-partners' deposits. It is already in vogue now, and has been for a good many years; but it gives us Parliamentary sanction. It deals with the question of the decease of co-partners, and what is to happen to the property in the Company which they may leave behind. Another schedule deals with the Act of 1914, referring to the Company's property at Belvedere, and with the construction of works, and maintains the powers which we acquired under the 1914 Act.

Then there are clauses for the protection of the Port of London Authority. It seems to me to be very often the case that the more powerful an authority, the more protection it wants; but that is one of the things we cannot avoid. There are also regulations with regard to the local authority in respect of some footpaths over the land at Belvedere.

That is the Bill we are asking you to authorize us to go forward with. I might say that the Bill was read a second time in the House yesterday—these things, of course, have to be done in conjunction with the sittings of Parliament.

I now move the resolution—which I will ask the Deputy-Chairman to second—

That the Bill now before Parliament intituled;

> "A Bill to consolidate the Acts applying to the South Suburban Gas Company; to make new provisions as to the charges for the gas supplied by and the application of the profits of the Company; to extend their limits of supply; to authorize the Company to acquire additional lands; and for other purposes,"

be and the same is hereby approved subject to such alterations as Parliament may make therein, and the Directors may approve.

Mr. BENJAMIN R. GREEN (Deputy-Chairman) seconded the resolution.

Mr. H. K. SCOTT, after thanking the Chairman for his lucid résumé of the provisions of a very complicated Bill, said he hoped he would not be thought to be grasping, or more mercenary than anyone else, but, in view of the suggestion that the Directors might at a later date be asking the shareholders to provide further capital, he had been trying to calculate roughly what were the probabilities in regard to a Company such as this. As he understood it, the shareholders were secure for 5½ p.ct. on their capital; and he had tried to work out what were the possibilities or the probabilities of the Company ever paying more than the 5½ p.ct. His calculation was—he felt sure it was all wrong, but he wanted to be put right—that for each 1d. per therm decrease in the price of gas, the shareholders would get about ¼ p.ct. increase of dividend. He appreciated that there were innumerable unknown quantities, but, at any rate, he would ask himself that question whenever he received a request to put up more money. It was a reasonable question, he believed.

Lieut.-Col. J. H. BORASTON said that when reading the short summary of the Bill which had been published in the "GAS JOURNAL"—that was the only account of it he had seen—he had noticed that the Bill restricted the number of Directors to eight; and he asked whether that included the co-partner Directors or not, because it was not made clear in the account he had read.

Mr. JOHN RANDALL asked whether, under the provisions of the Bill, the division of profits among the co-partners would be the same as at present, or whether, if there were to be a variation, it would be more or less favourable to them.

The CHAIRMAN, referring to the number of directors, said Clause 57 of the Bill simply repeated the existing powers. It stated that: "The number of directors (exclusive of any directors for the time being holding office pursuant to any scheme referred to in the section of this Act of which the marginal note is 'Employee Directors') shall be not more than eight nor less than five."

With regard to the allocation of profits in the Bill, he did not think he could go further than to say that he did not anticipate that they would be less than in the past. The hope was that they would be more, because the underlying idea of the Bill was that there should be a greater inducement to capital and labour to work together for the common good, which, in this particular case, was to sell gas at a lower price. Therefore, so far as the hopes of the Directors were concerned—and he believed they rested upon a firm foundation—he did not think they would be in the position of asking the shareholders to accept a lower dividend than they had been receiving in the past, and the hopes of the Directors, he believed, rested upon a firm foundation.

With regard to the increased dividend, if there be an increase, he was afraid he could not take upon himself the rôle of a prophet;

but the shareholders could assure themselves that the Directors did put forward this proposal in the belief, and the assurance, that they would not be less happily received when they came before the shareholders on future occasions than they had been in the past. The great thing the Company obtained by this new arrangement was the assurance that whatever happened, and whatever crises might arise from time to time, whether political or industrial, they would be entitled—as they should be, and as they ought to have been long ago—to raise the price of gas to such an extent as would enable them to do what Parliament was desirous they should do—namely, to pay a fair rate to capital, in the same way as they would be expected to pay a fair rate to labour for the services which labour gave. Those were two obligations which took priority, if he might say so, of any obligation in regard to the price of gas—in other words, in all that they might do for the consumers, they were entitled to, and should, remunerate capital in the same way as they should remunerate labour. That was a very great protection which the Bill would give, and it was, in his view, its great advantage.

Mr. RANDALL asked whether the amount of the one-eighth of the surplus profits which would go to the co-partners would be more or less than that which they at present received, or whether it was estimated on a different footing.

The CHAIRMAN said it depended upon two things—the basic price, whatever that might be, and the price at which the Company were selling gas. It was not easy to answer the question; but the figure would be something about the same as the present figure. If the whole of the undertaking pulled together and nothing unfavourable intervened, the price of gas, it was hoped, would be reduced during the present year. In that case the amount payable to the co-partners would certainly be maintained, and possibly increased. It was very difficult to say absolutely, but the Directors believed that in no circumstances—not, at any rate, in the near future, so far as they could foresee—would it be less than at the moment. If the shareholders agreed to the proposal, they were bound to allow the machinery to get to work; and until the machinery got to work one could not tell exactly how it would turn out. There was every reason to believe that it would not be less effective, if he might say so, from a dividend point of view than it had been already. That was not an answer to the question; but it was as much as he could say.

Mr. RANDALL explained that he was merely anxious to know that the co-partners would not be put into a worse position than they were in at present, although, of course, if the Chairman were able to say that they would be in a better position he would be still more gratified.

The CHAIRMAN replied that certainly they would not be in a worse position than at present. On the other hand, they would be encouraged to do even more for the undertaking than in the past, because they, as well as the shareholders, felt the disadvantages of the old system. There was another point which he might have mentioned, and that was that, just as the shareholders would get security by this Bill, if it became an Act, which they had not had before, so the co-partners would get a security, because for the first time this arrangement with them would be a statutory one, and could not be brought to an end at short notice at the will of the Directors. Up to the present the arrangement with the co-partners had been dependent upon determination at any time by the Board. When the Bill passed, as he hoped and believed it would, the arrangement with the co-partners would become just as statutory as the arrangement in respect of the shareholders' dividends, and he could not but think that this would be a stronger inducement for them to put forward their best efforts for the undertaking than had existed even under the old system. [Applause.]

The resolution was then put to the meeting, and carried.

A VOTE OF THANKS TO THE CHAIRMAN.

Sir J. FORTESCUE FLANNERY proposed a vote of thanks to Dr. Carpenter for the manner in which he had presided over the two meetings. They had been important meetings, particularly the second one, because the Bill, which had been so fully explained, was an epoch-making Bill in the history of co-partnership, making it, as it did, statutory, and taking away from it any risk of accidental or temporary change, or even destruction. It was a complicated Bill of something like 120 clauses, and had been explained with a lucidity and completeness that had left him wondering how it could have been done in so short a time. Dr. Carpenter had succeeded to the Chair vacated by Sir George Livesey. It was a great inheritance, and had been filled by Dr. Carpenter in such a way that everyone could look forward with the utmost confidence to the success of the undertaking, the prosperity of their investments, and, above all, to the continuance of that splendid example of peace in industry that was expressed by the term "co-partnership."

Lieut.-Col. BORASTON, who seconded, expressed appreciation of the manner in which Dr. Carpenter had explained the provisions of the Bill, and was particularly pleased to notice that advantage had been taken of the Bill to place the co-partnership bonus once more on a fixed basis having relation to the payment of dividends and the cost of gas. That rectified a disadvantage under which the co-partners had been suffering for three or four years, which was unfortunately unavoidable; and he was very glad that the first opportunity had been taken to readjust the matter.

The resolution was carried with acclamation.

The CHAIRMAN, in a brief response to the vote of thanks, suggested the inclusion therein of the staff and employees. He could assure the proprietors that the employees, both technical and commercial, had worked exceedingly well, and he was sure that, under the new stimulus they would continue to do what they had done up to the present—namely, provide a magnificent example of how capital and labour could unitedly carry on important work for the benefit of the community at large.

The meeting then closed.

GAS TESTING IN THE METROPOLIS.

Reporting upon the work carried out during the quarter ended Dec. 31, the Public Control Committee of the London County Council set out the following particulars relating to the testing of the gas.

(1) *Gas Light and Coke Company.*—The gas was tested on 1012 occasions for calorific value (involving 1380 individual tests with the Boys non-recording calorimeter, and 276 results derived from recording instruments). These tests gave results varying between 518·2 and 486, with an average of 502 B.Th.U. for the quarter; the standard declared by the Company being 500 B.Th.U. per c.ft. The pressure of the gas was tested on 1458 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 814 tests were made for sulphuretted hydrogen; no trace being found on any occasion. 158 tests were made for total sulphur impurities; the results being, maximum 35·5, minimum 19·2, and the average 26·1 grains per 100 c.ft. of gas.

(2) *Commercial Gas Company.*—The gas was tested for calorific value on 276 occasions (involving 552 individual tests), and gave results varying between 532·5 and 481·2, with an average of 503·3 B.Th.U. for the quarter; the declared calorific value of the gas being 500 B.Th.U. per c.ft. The pressure of the gas was tested on 552 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 276 tests were made for sulphuretted hydrogen; no trace being found on any occasion. 158 tests were made for total sulphur impurities; the results being, maximum 42·7, minimum 18·7, and the average 27·4 grains per 100 c.ft. of gas.

(3) *South Metropolitan Gas Company.*—The gas was tested for calorific value on 551 occasions (involving 1100 individual tests), and gave results varying between 572·3 and 550·2, with an average of 562 for the quarter; the standard declared by the Company being 560 B.Th.U. per c.ft. The pressure of the gas was tested on 1104 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 552 tests were made for sulphuretted hydrogen; no trace being found on any occasion. 473 tests were made for sulphur impurities; the results being, maximum 43·2, minimum 2·4, and the average 21·6 grains per 100 c.ft. of gas.

(4) *South Suburban Gas Company.*—The gas was tested for calorific value on 92 occasions (involving 184 individual tests) and gave results varying between 521·5 and 481·5, with an average of 501·1 for the quarter; the standard declared by the Company being 500 B.Th.U. per c.ft. The pressure of the gas was tested on 184 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 92 tests were made for sulphuretted hydrogen; no trace being found except on one occasion.

(5) *Wandsworth, Wimoledon, and Epsom District Gas Company.*—The gas was tested for calorific value on 78 occasions (involving 156 individual tests), and gave results varying between 491·8 and 458, with an average of 474·1 B.Th.U. for the quarter; the standard declared by the Company being 470 B.Th.U. per c.ft. The pressure of the gas was tested on 156 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 78 tests were made for sulphuretted hydrogen, no trace being found on any occasion.

GAS EXHIBITION AT DOUGLAS.

A highly successful exhibition of gas cooking, heating, lighting, and café appliances, inaugurated by the Douglas Gas Light Company, has just been concluded in the Palais de Danse, Douglas, Isle of Man.

Lord FAIRFAX OF CAMERON opened the exhibition. He was introduced by Mr. QUILLIAM, a Director of the Gas Company, who mentioned that one of Lord Fairfax's ancestors, General Fairfax, was in Cromwell's time presented with the island for services rendered to the Parliamentary cause. Dealing with the question of gas in Douglas, Mr. Quilliam made a special point of the Gas Company's desire to give their consumers the best quality of gas, the most satisfactory service, and the most up-to-date and economical appliances.

A vote of thanks to Lord Fairfax, proposed by Mr. DAVID GIBB (of Messrs. R. & A. Main, Ltd.), and seconded by Mr. P. J. CRELLIN (a Director of the Gas Company), was carried with acclamation.

The exhibition was arranged and carried out by Mr. A. R. Bisset, A.M.I.Chem.E., Engineer and Manager, with the co-operation of the following firms: Messrs. R. & A. Main, Ltd.; Jackson Boilers, Ltd.; George Bray; and Todhunter & Elliott, of Douglas, who exhibited the "Electrolux" refrigerator operated by gas.

The brilliant gas lighting and tasteful decoration of the hall were voted the best ever seen on the island. Among the special features were a series of rooms fitted with gas heating and lighting, and furnished by Mr. R. Axom, of Douglas, and a display of "Vitreosil" globes with water running over them when practically red hot. The cookery lectures were in the capable hands of Miss H. H. Tuxford, who at each lecture had an audience of 600 to 1000 people.

The results of the exhibition were highly satisfactory. Messrs. R. & A. Main's new "Mainamel" cookers were admired; many orders being placed for cookers in this finish.

Judging by this exhibition, the Directors of the Douglas Gas Light Company, and their capable and energetic Manager, are fully alive to their responsibilities; and there is no doubt that in this part of the world gas can hold its own against all competitors.

A fuller account of the exhibition will be published later in the "GAS SALESMAN."

The Belfast Gas Committee have again decided to make the usual allocation, amounting to approximately £11,000, for the payment of the interest and sinking fund on the City Hall. This sum is from the profits of the gas undertaking, and the allocation is in accordance with the practice which has been followed for many years.

RADIATION LIMITED.

The Live Force in the Gas Industry: Remarkable Progress.

The Annual Meeting of Radiation Limited was held on Feb. 15 in Birmingham.

Mr. H. JAMES YATES, the Chairman of the Company, presided, and in moving the adoption of the report and accounts said he welcomed the opportunity of meeting the shareholders. There were not very many industrial concerns in this country who had been able to submit year after year reports of such substantial prosperity as had their Company. The report and accounts gave full particulars regarding the position of the Subsidiary Companies, and other important matters relating to the Company. The Board had also specially arranged to anticipate the usual date of the meeting by something like five weeks, so that shareholders might at the earliest possible moment be able to judge of the true state of affairs; but owing to the work thereby entailed it would not be practicable to hold the meeting at so early a date in future without seriously interfering with the organization of the business.

Dealing with the combined balance-sheet, the Chairman said that the item of £2,392,675 was the cost to Radiation of the whole of the shares of the Constituent Companies. In regard to the amount due to Radiation by Constituent Companies—viz., £1,233,430—that had grown up by accretions under the following heads:

(1) Dividend of 1927 declared, and to be paid by the Constituent Companies, and balance of their dividends for past years, not paid over.
(2) Special dividend of £565,643, for the bonus shares issued in April, 1927.
(3) Charges paid in the first instance by Radiation on behalf of the Constituent Companies, and charged by them to the Constituent Companies.
(4) Loans by Radiation to the Constituent Companies.

Turning to the assets side, the total value of the freehold and leasehold land, buildings, plant, machinery, fixtures, &c., as they stood in the books, was upon a conservative basis.

The investments amounted to £1,423,008, the greater part of which were in gilt-edged securities; and of that amount £1,415,448 had a market value to-day of £1,417,354.

The Board had endeavoured to create such a position for the Company that the Radiation shares should become a gilt-edged industrial investment. They had built-up a huge business, and had created a financial position for the Company that could withstand any adverse conditions which might conceivably arise—and this was not too general a state of things.

The combined pre-amalgamation profits of all the Companies who joined Radiation were £221,718. By increasing the business since the amalgamation, the Board had raised those profits to such an extent that they had averaged £516,740 per annum—a figure covering the preference dividend eight times over. At the same time they had not been charging excessive prices for their goods. They had all along held their own in an open competitive market. If prices and quality were not right, naturally their goods would not command such enormous sales.

The Constituent Companies of Radiation Limited were twelve in number. There were seventeen large works, covering about 140 acres of land; and a variety of trades—quite apart from the gas-stove trade—were carried on. An enormous turnover had been built-up; and if to-day they made an all-round reduction of only 10 p.ct. from selling prices, the ordinary shareholders would have to go without dividends. Further, if the Managing Directors were to forego their commission and bonus (and assuming that the same efficiency of management could still be ensured), the amount thus foregone would represent only a very small percentage in the way of reduction of prices to customers. Those of the Directors who had been responsible for the creation, development, and running of the business had fixed from the very outset a definite conservative policy in the matter of the building-up of reserves and the declaration of dividends. From that original policy they had never at any time or in any respect deviated, and no outside influence had either directly or indirectly modified that policy in any way whatever, either in the increase of dividend or the distribution of bonus shares.

During the comparatively short time Radiation had been in existence, this country had been passing through extraordinarily difficult times. Let them compare the position of many other industrial concerns with that established for Radiation. They had steadily built-up a huge business. Commencing without any reserves, they had created large reserves. They had acquired many acres of additional land, which they were rapidly covering with buildings. Owing to the large turnover created, the amount of the Company's profits had enormously increased—from which the shareholders had benefited. Taking the ordinary shares upon a very conservative estimate of their market value—viz., 32s. 6d.—the aggregate of the original ordinary share capital, the dividends and bonuses on this, and the appreciation in value of the ordinary shares, was three times the amount of the original share capital itself, and the financial stability of the Company was exceptionally strong. This was a record of which, he ventured to say, the managing directors of any company in the country might indeed be proud. ["Hear hear."]

No one who had had experience of company management on any large scale would suggest for one moment that those results had been attained—either this year, or year after year—simply by sitting still and doing nothing. The secret of their success lay in concentrated and unceasing research work, in continual fresh invention and designing, and in the energetic carrying-on of industrial work and selling propaganda. Every type of apparatus, the sale of which was bringing such prosperous results to their business to-day, was a new type. In each type they made the successful achievement of to-day the starting-point for the further advance of to-morrow. There was no more live force in existence to-day in the gas industry than Radiation.

This state of things had been definitely attributed to the efforts of those of the Directors who had grown up in the business, and who devoted their whole time and attention to the planning and bringing about of the success which the Company had attained. The Managing Directors of Radiation were also the Managing Directors of the Constituent Companies, and at the same time the actual managing officials of those Companies; and they individually carried on the active control and management of their respective works and businesses. There were not a number of highly-paid officials under them in their respective works; and the whole emoluments of those Managing Directors as whole-time servants of their individual Companies would, in ordinary circumstances, be borne by these Companies, like wages and staff salaries, before arriving at their respective profits. Under their arrangements this was not done—all such emoluments being paid by Radiation. This, he was afraid, had led to a mistaken impression on the minds of some shareholders that those Managing Directors' emoluments were paid to them for their services as Managing Directors of the holding Company only, whereas they actually represented the cost of administrative management of the Constituent Companies' businesses.

He desired to emphasize that the service-agreements with the Managing Directors had been drawn-up in strict accordance with the provisions of the Articles of Association. They had never been altered or supplemented in any way since they were entered into at the beginning. It was neither customary nor helpful in competitive manufacturing and trading that the terms of agreements for whole-time service with directors and officials should be made public property. In the special circumstances, however, the Directors had consented to the giving of the information regarding those agreements conveyed in the circular sent along with the report and accounts. The fact must not be overlooked that the Managing Directors were Managing Directors of their own respective Companies before Radiation was formed, and were receiving commission on the profits of their respective Companies. The percentage of the commission given to those Directors under their agreements with Radiation was fixed so as to produce, on the total combined profits of the Radiation Companies at the time of the amalgamation, a commission based in substance on what they had each been receiving in their own respective Companies. It was recognized to be of the utmost importance that each of the Managing Directors should be interested in the success of Radiation as a whole, and not just in the section in which his immediate activities were specially engaged. Bonus was paid only out of excess profits over and above the combined profits of the whole of the Companies as taken over at the date of the amalgamation. The position was that, if the total profits of the combined concerns should in any year fall below the pre-amalgamation total profits, the commission payable to the Managing Directors would be correspondingly less than they had been receiving before the amalgamation, and no bonus at all would be payable.

As to his, the Chairman's, personal position, he had an agreement with his own Company, and a commission on its profits, which, owing to the great development of that Company's business, brought him in a substantial and increasing income; and the provisions of his old agreement were of such a nature that the Company's professional advisers pointed out that it must be cancelled—and compensation paid to him for its cancellation. He naturally recognized the position, and had accepted the terms that were offered.

After a time, when the profits of the Company's business had exceeded the utmost anticipations, the Managing Directors, without any obligation whatever on their part, and before certain questions had begun to be raised, considered the question of making a voluntary reduction in their emoluments, and decided to do so; but when, shortly thereafter, an agitation was started, the Managing Directors not unnaturally had decided to leave the matter in abeyance for the time being. Eventually, as mentioned in the circular, they made voluntary reductions of a very substantial nature.

Before leaving the report and accounts, he would like to say, in reference to the dividend, that he felt sure shareholders would appreciate the fact that the Board had felt justified in recommending an increase in the rate of dividend on the ordinary shares from the previous figure of 8¾ p.ct. net (equivalent to 10⅞ p.ct. gross) to 12½ p.ct. gross. Paying the increased dividend on an increased capital, however, reduced appreciably the margin of undistributed profits; and hopes of being able to maintain the dividends were based upon the assumption that the agitation which was seriously prejudicing the business was brought to an immediate end.

As to the present position with regard to the Company's apparatus and prospects, he was satisfied that no one with any acquaintance with the nature of the business would imagine for a moment that they could safely leave their apparatus to sell themselves. Before any one of their types of apparatus could be sold, it had first of all to be created. That was where long experience and the accumulated results of their research work were essential. The organization and carrying-on of the selling side of a great business like theirs was also a most difficult and complex matter. For some years past they had largely advertised in the Press. This had never before been attempted by any gas-stove makers, except in a very small way; but on the formation of Radiation, they were able gradually to develop their advertising, which they were steadily extending year by year.

Research work had been the chief factor in the success of the business. They spent in research and development work between £50,000 and £60,000 a year. This was a small percentage on the huge turnover, yet it was a big item in itself; and, as in the case of their extensive advertising policy, it was only by the formation of Radiation that they had placed themselves in a position to face such a heavy expenditure. The result had been that they had de-

veloped their goods to so high a degree of efficiency that they had set a standard by which all other makes were judged—and they had set that standard throughout the world, with the result that their trade, which at one time was chiefly confined to the British Isles, was becoming world-wide. From those facts shareholders would recognize how all-important a research organization was to the continued success of their business.

The original "New World" cooker was placed on the market nearly five years ago, and they had since improved upon the original model. The "New World" cooker, with its single oven burner and direct bottom-flue-outlet, was recognized to-day as the supreme achievement in cooker design, and had revolutionized the work of the gas appliance industry. Not only had the Company profited, but the gas industry as a whole had benefited from the Company's research work which had led to the production of this apparatus. With the "New World" oven they introduced the "Regulo" automatic heat controller, which made cooking automatic, and enabled any inexperienced person to attain results as good as those producible by the most skilled cook; and for the hotplate of the "New World" cooker they had developed the "Rado" burner, the "Unit" bar, and the "Semisol" plate—now household words in the gas industry.

The Board and Managing Directors pressed for the attainment of higher and higher standards, as in that way they believed that the whole level of the work in the industry would be raised, and that the future for gas would be the brighter as a result. On the combustion side of the problem they had devised tests which had an accuracy of one or two parts per million, and had set a standard of combustion which ought to be attained by all cooker hotplates. Gas undertakings were adopting those tests, and out of the work of their Company there had come a general realization of the need of such a standard.

As with cookers, so with gas fires. The "injector-ventilator" gas fire, with its "Thermo XX" radiants—another product of their development work—was the standard for gas fires to-day. In the design of gas fires, hygienic and thermal efficiencies were, in the past, the chief considerations. Years ago, however, he realized that those two factors, important though they were, were not the sole factors to be considered if the maximum of comfort were to be attained. No type of fire gave exactly the same kind of warmth as the sun, and yet it was to the sun's rays that their bodies most satisfactorily responded. The problem on which the Board were engaged was, if possible, to produce a gas fire which should have definite therapeutic value and should at the same time provide a more congenial warmth—more satisfactory than that obtainable from any other artificial source of heat. They had completed the first stage of the journey, and would shortly be in a position to place on the market a gas fire which was a marked advance on anything hitherto available. While the Company's new gas fire would cost more to produce than the present types, they were hoping they might be able to avoid increasing the cost to their customers.

These new types of apparatus generally, owing to their special improved construction, actually cost more to produce than the old types, but the costs were relatively reduced, as, owing to the enormously increased turnover, they could work at a lower percentage of profit. Prices to customers had been reduced, and future reductions in prices would depend upon increased output of their products.

As regards prospects generally, in gas and the gas industry he had the strongest faith. Gas was one of the great industries of the country. Though electricity had in comparison the attraction of greater novelty—and great things were said as to what it could do—yet gas had never been in a stronger position, or more hopeful in outlook, than at the present time.

Last year he had told the meeting that the Board had under consideration a scheme by which employees might have an opportunity of participating in the success of the business. They had since devised a Deposit Scheme whereby employees could deposit every week a percentage of their wages, on which they received a minimum of 5 p.ct. interest, free of tax. The fact of the money being on deposit enabled them to draw the amount at short notice with 5 p.ct. interest up to the date of withdrawal. If they left their money on deposit from Jan. 1 to the time the final dividend was paid, they received interest up to £10 12s. 6d. p.ct. gross, so long as the Company's ordinary share divdend equalled or exceeded that rate.

In conclusion, he would like to express for himself and his Co-Directors deep appreciation of the loyal and strenuous work of the various staffs throughout the year. He moved:

> "That the report and balance-sheet for the year ended Dec. 31, 1927, as presented by the Directors, be received and adopted, and that final dividends be declared as follows, and paid on April 12, 1928: 3 p.ct. to Dec. 31, 1927, on the 6 p.ct. cumulative preference shares, less income-tax, and 9¾ p.ct., less income-tax, on the ordinary shares, making, with the interim dividend paid in October, 1927, a total dividend of 12½ p.ct. for the year."

In the discussion which followed at the conclusion of the Chairman's speech, Mr. JAMES DAVENPORT, of London, said that Radiation had succeeded to an extent far beyond anything that was anticipated by its founders. The agitation that turned on the remuneration of the Directors appeared to be a complaint against the success of the Company. He urged the sanctity of contracts, and emphasized that the remuneration of the Directors was strictly in accordance with agreements entered into when the Company was formed.

Sir PERCIVAL BOWER referred to the refusal of the Directors to allow a Committee of Shareholders to make certain investigations, and urged the Board to have a domestic Committee of Inquiry.

Mr. GILBERT VYLE urged the Directors not to give way before Sir Percival Bower's threats. It was news to him, he declared, that a minority was treated unfairly because it could not impose its will upon a great majority. The Directors' remuneration had been earned upon the profits of the business; and shareholders should be glad to pay it.

Sir DAVID BROOKS stated that the agreements with the Directors ended on Dec. 31, 1929; at the end of that time, if the shareholders wished to make any change, they had it in their hands to do so. "In the meantime," said Sir David, "don't keep up this agitation. Don't be cowardly enough to repudiate the valid agreements already entered into."

After further discussion, Sir PERCIVAL BOWER moved an addendum to the resolution, providing for a Committee of Inquiry which should report back to the shareholders of the Company at an Extraordinary General Meeting.

The CHAIRMAN pointed out that he was advised that such an addendum was out of order; and as Sir Percival refused to put his request in the form of an amendment, it fell to the ground.

Both resolutions being put, the Chairman declared them lost on a show of hands, and a poll was thereupon taken. As a result, both were carried—the first by a majority of 453,395, and the second by 463,936. A considerable number of proxies were received too late, otherwise the majority for the resolutions would have been much larger.

AN INDUSTRY UNITED FOR PUBLICITY.

An Address by Mr. W. M. Mason.

In an address to the Glasgow Publicity Club, on Friday, Feb. 17, Mr. W. M. Mason gave a brief history of the British Commercial Gas Association, of which he is General Manager. He showed how an industry with over 120 years' experience of active business life behind it, and rightly claiming to be national in every sense of the term, has, through the pooling of the brains of its most progressive business managers, in co-operative effort, not merely promoted its own welfare, but moulded and educated public opinion to the wonderful part gas plays in the domestic, business, and civic life of the community.

As far back as 1907, he said, Mr. F. W. Goodenough (the Controller of the Sales Department of the Gas Light and Coke Company), in a paper read before the Institution of Gas Engineers, emphasized the necessity for developing the sale of gas on modern lines; but it was not until October, 1911, that the Publicity Association was formally launched. In March, 1912, the Association began active service "to promote the commercial prosperity of the gas industry by co-operative action," as the constitution happily expresses it. The faith of the leaders of the movement in the soundness of their principles, as well as their belief that the real business sense of the gas industry would ultimately endorse their policy, have been fully justified.

Mr. Mason explained the publicity campaign of the Association and the efficient service which is offered to members; and then, after his outline of the work done, he proceeded to supply an answer to the possible question: "But what about the results of all this co-operative effort?" The gas industry, he pointed out, is able to show an average annual growth of:

3144	million c.ft.	for the	years		1884–1894
5042	"	"	"	"	1895–1904
5655	"	"	"	"	1905–1913
4940	"	"	"	"	1914–1924

While during the last three years the average rate of increase has been no less than 11,000 million c.ft. per annum. The use of gas is actually expanding, therefore, at a steadily increasing rate—a certain sign that it is far from reaching saturation-point. New ideas are stirring throughout the gas industry in this country, fresh life-blood is coursing through its veins, activity is taking the place of sloth and indifference in every direction, and last, but by no means least, the spirit of co-operation for mutual benefit, both between one gas undertaking and another and between the makers of gas on the one hand and the manufacturers of appliances on the other, is growing steadily every day, and is becoming a mighty compelling and propelling force in the old gas chariot.

In the creation and fostering of this good spirit, concluded Mr. Mason, the British Commercial Gas Association has played, and must increasingly play, a leading part. The combination is certainly not, either in intention or in fact, designed—as so many big trust and industrial combines are—to exploit the long-suffering public. It could not, even if it would, as it is hedged about by so many safeguards. No industry can more honestly claim to have been freer of the vice of profiteering. The ideal is rather the high ambition to give the best possible service at the least possible cost.

Explosion at Cheltenham.—Recently, when Post Office engineers, who were using a blowpipe, were repairing an underground cable in Cheltenham High Street, the lids of two manholes 200 yards away were shot into the air, and the concrete pavement was shattered. It is presumed that gas had leaked into the telephone conduits, and was ignited by the blowpipe.

Large American Industrial Merger.—News has been received from America regarding the organization of a large industrial merger which is being formed of several important companies. These are the U.G.I. Contracting Company of Philadelphia, the Public Service Production Company of Newark, Messrs. Dwight P. Robinson & Co., of New York, and the Day and Zimmerman Engineering and Construction Company of Philadelphia. The U.G.I. Company have for many years been responsible for the construction and installation of Lowe carburetted water gas plants, and have now added to their interests the erection of coal gas and electric power plants, and also manufacture and apply road binders. They have erected more than one thousand carburetted water gas plants, and recently acquired the right to build the German Stettiner coal gas oven in America. The Public Service Production Company have been responsible for a number of large electric power stations and gas-works.

PROGRESS OF THE SUTTON GAS COMPANY.

A Record Year in 1927.

During the last six years the Directors of the Sutton Gas Company have been very active. The increase in the output of gas in this period amounts to the astonishing figure of between 45 and 50 p.ct.; and to cope with this development—a growth which is still in progress—the Company's manufacturing plant has been reconstructed and enlarged. On Feb. 11 the London and Southern District Junior Gas Association had an opportunity of inspecting this work, which has been carried out under the supervision of Mr. Henry Gage, the Engineer and Manager; and they were greatly impressed by the thorough manner in which he has dealt with the extensions. Last year a million c.ft. Humphreys & Glasgow carburetted water gas set was installed, and brought into operation in November; and recent work includes the remodelling of the meter house and the governor house; the installation of a 100,000 c.ft. per hour station meter in place of one having a capacity of 30,000 c.ft.; and a new messroom for the men. Nor have the Company's activities been confined to the works. Equal energy has been displayed in reorganizing the distribution system. In 1927 nearly eight miles of mains were laid, and new showrooms have been built—regarding which an illustrated article was published in the "JOURNAL" for Dec. 7, 1927, p. 676.

A RECORD GROWTH IN BUSINESS.

During and after the war, in common with other gas undertakings, the Sutton Company had to face many difficulties; and just when the horizon appeared to be clearing came the disastrous coal strike of 1926. However, at the beginning of 1927 they were in the fortunate position of having no forward contracts for expensive coal. Throughout the year, markets were stable; and they were able to purchase coal at a reasonable price. The year was one of great development. The number of consumers increased by 800 or 900, and the sales of gas by a matter of 40 million c.ft., or 9 p.ct. As to the price, this has been reduced to 9d. a therm, which, taking into consideration the circumstances of the Company, is excellent.

To demonstrate to the local authorities in their area what the Sutton Gas Company were accomplishing in the way of good service, the Directors thought it would be most fitting if they invited local public men to an inspection of the works. This idea was acted upon, and the inspection took place on Feb. 16. Following it, the visitors were entertained at luncheon—Mr. E. J. HOLLAND, D.L., J.P. (Chairman of the Company), presiding.

THE COMPANY CONGRATULATED.

Mr. GEORGE DENNIS (Chairman of the Sutton Urban Council) congratulated the Sutton Gas Company on a successful year's working in 1927. It was highly gratifying that the normal course of business had not been interfered with by strikes, which affected so adversely the industry of the country. He also congratulated the Sutton Company on the manner in which they had kept abreast of the times. Recently houses had sprung up very rapidly in the area served by the Company, but throughout all this development there had been no lack of gas—a fact which spoke very well not only for the enterprise of the Company, but also for their efficiency. This extension in business explained why the Company needed more capital; and in this respect he would draw attention to the fact that the relationship between the output of gas and the capital raised had remained substantially constant. He understood that the Company had announced a further reduction in the price of gas. This was good news, and it showed that the Sutton Gas Company had the public welfare at heart. Mr. Dennis said he would add that associated with the Company was Mr. Henry Gage, who had proved himself a most worthy and capable Engineer and Manager. He asked those present to drink to the success of the Sutton Gas Company, and coupled with the toast the name of Mr. Holland, who was a man of many parts, and to whose work the town of Sutton owed a debt of gratitude.

PUBLIC SERVICE BY PRIVATE ENTERPRISE.

Mr. HOLLAND, responding to the toast, first of all said how sorry he was that certain gentlemen—among whom were Sir Henry Maybury, Director-General of Roads, Ministry of Transport; Mr. R. J. Milbourne, of Messrs. C. & W. Walker, Ltd.; and Mr. J. W. Buckley, the Engineer and General Manager of the Hornsey Gas Company—had been unable to be present at their gathering. He regarded their meeting as being excellent in that it brought together people who were associated with the welfare of Sutton, and thus encouraged co-operative effort. The manufacture and distribution of gas formed a public service, but it was, to his mind, best that such work should be carried out by private enterprise. ["Hear, hear."] He thought they would agree that if the gas undertaking was controlled by the local authority, the interests of the consumers would not be better served than they were at present by the Sutton Gas Company.

Many people, of course, laid great stress on the fact that gas undertakings had a monopoly—that they were not up against competition. It was true that they had a monopoly, that they were entitled to supply gas in their particular areas; but the statutory conditions of supply were very strict, and the obligations imposed by Parliament could only be discharged by concerns prepared to shoulder responsibility. He thought they would agree with him that in their area of supply the Sutton Gas Company were discharging those obligations in an efficient manner. As for competition, this was severe both from coal and from electricity. However, gas was more than holding its own. Compared with coal, it was more convenient, saved labour, and helped to bring about a purer atmosphere; and compared with electricity it was much more economical. In spite of all competition, the Sutton Gas Company had forged ahead.

AN EVENTFUL PERIOD.

Their output to-day was 45 to 50 p.ct. greater than it was six or seven years ago. He might say that the thirteen years he had been associated with the Company had been the most eventful in their history. There were the difficulties of the war and the post-war years, and in 1926 there was the disastrous coal strike. He wondered what the public would have said had there been any shortening in the supply of gas during that period. People were so accustomed to the turning of a tap, and satisfying their lighting, cooking, and heating needs, that they did not think of the steady, unfailing work carried on at the gas-works every day and night of the year.

Another thing that some people suggested was that the Company paid a handsome dividend. Well, before the war the dividend was at the rate of 6 p.ct. per annum; and money conditions were then very different from those existing to-day. By dint of hard work they had been enabled to declare a dividend for last year of 8 p.ct.; and if they had regard to the figures for income-tax, the position of the money market, and the difficulty of raising capital, the present return was not appreciably in advance of that ruling before the war. Moreover, the business had developed enormously. The Company were out to serve the best interests of consumers, as was evident from the fact that they were now selling gas at 9d. a therm. As further proof of this desire to give good service—if, indeed, such proof were needed—he would mention that it was the policy of the Company to encourage their customers to communicate with them at once in case of any dissatisfaction. They were doing all possible to maintain consumers' appliances in efficient condition. Last year, which was one of the most satisfactory in the history of the Company, saw an increase in the number of consumers of 800 or 900.

CO-OPERATION.

The fulfilment of the aims of the Company, continued Mr. Holland, could only be brought about by co-operation. One of the characteristics of the Company was the excellent team work. Every department endeavoured to pull together.

As an announcement of interest, he might tell them that the Directors had been considering the question of making the price of gas uniform throughout their area of supply. For some time past the charges in the Worcester Park and Banstead districts had been greater than that obtaining in Sutton by 4d. per 1000 c.ft.—though the Company were in fact entitled to charge an additional 6d. in these areas. The Directors felt that the time had come to make the price uniform throughout. Before concluding, Mr. Holland said how much they missed the presence of their late colleague Mr. Humphrey J. Bracey, who for many years had, as Director, rendered services of the greatest value to the Company, and who had endeared himself to all with whom he came in contact. The Directors had invited Mr. E. Morris Gibson to fill the vacancy on the Board.

TRADE NOTES.

Slingsby Lifting Trucks.

A 48-page booklet describing and illustrating Slingsby lifting trucks of all kinds has been published by Messrs. H. C. Slingsby, of 89, 95, and 97, Kingsway, and 71, Great Queen Street, W.C. 2.

"Underjet" Bye-Product Coke Ovens.

Messrs. Simon-Carves, Ltd., of Manchester, have received an order from Synthetic Ammonia and Nitrates, Ltd., Billingham (a branch of Imperial Chemical Industries, Ltd.), for two batteries of their "Underjet" bye-product coke ovens.

Smith Brothers & Co. (Hyson), Ltd.

It is eighty years since the business of Messrs. Smith Brothers & Co. (Hyson), Ltd., engineers, iron and brass founders, of Hyson Green Works, Nottingham, was founded; and the firm claim that during the intervening period they have done some pioneer work in connection with the application of steam power. A booklet giving a short history of their progress has just been published by the firm.

Electro-Chemical Deposition of Metals.

Fescol, Ltd., of 101, Grosvenor Road, Westminster, S.W.1, have published a fully illustrated brochure describing the "Fescol" process of electro-chemical deposition of metals. For rebuilding worn mechanical parts and for the protection against erosion and corrosion of parts exposed to atmospheric and chemical action, the "Fescol" process is excellent. The deposited nickel, chromium, &c., is unstrippable.

Lower Charges at East Cowes.—The Directors of the East Cowes Gas Company announce a reduction in the price of gas of 1d. per therm—viz., to 11d. per therm. The reduction will take effect as from the date of reading the meters for last (Christmas) quarter. As from the same date a corresponding cash rebate will be allowed to prepayment meter consumers, pending the requisite alteration to the meters.

GAS COMPANIES' RESULTS FOR 1927.

CAMBRIDGE.

The annual meeting of the Cambridge University and Town Gas Light Company took place on Feb. 15. Dr. E. H. PARKER, the Chairman of the Board, said that during 1927 the Company had made 816 million c.ft. of gas—an increase of 2½ p.ct. The erection of houses had entailed the extension of many mains. The Company, he said, had had an exceptional year. An unexpected fall in the cost of coal, and the good price obtained for coke, were together responsible for the large balance of £27,132 carried to the profit and loss account, and for the fact that they had been able to strengthen their renewal fund "C" by a sum of £15,000. The balance of £27,132 had to provide a year's interest on the debenture stock and a year's dividend on the share capital of the Company. It was difficult after the termination of the coal strike to forecast results, but, as soon as the Board saw their way, the price of gas was reduced from 10d. per therm to 9d. per therm as from March last, and again from 9d. to 8d. per therm in June last.

The sale of fittings had again been satisfactory during the year, especially fittings used for cooking and heating. No fewer than 1222 gas fires had been sold, 539 gas cookers, and 224 water heaters. The number of ordinary consumers had increased by 375 during the year, and the users of slot meters by 112. There were now 40 more public lamps. In June last the Directors sold by public auction £13,300 of 7 p.ct. stock, when the satisfactory sum of £16,000, or an average price of £121 16s. p.ct., was obtained.

The Board had decided to utilize the power conferred on them by the Provisional Order obtained in 1921, and to establish a superannuation fund for the officers and clerical staff of the Company. Under this Order a sum not exceeding ¼d. per 1000 c.ft. of gas supplied during the year could be applied for this purpose as the Company's contribution to the fund. The cost of the proposed fund and their co-partnership scheme, taken together, would only amount to about one-third of a penny per therm, which did not seem to the Board to be an unreasonable sum to apply to the benefit of those employed by a Company of their size.

The Directors wished again to record their indebtedness to the Manager, the Secretary, the Accountant, and the staff and workmen for their efficient services.

It was agreed that dividends at the usual rates be paid.

The CHAIRMAN then moved a resolution authorizing the Company to prepare and put into force a superannuation fund.

Mr. W. JONES seconded this resolution, which was carried.

CANNOCK AND HEDNESFORD.

The report shows that the receipts on revenue account were £30,757, and to this has to be added a balance brought forward from 1926 of £666, making a total income of £31,424. The expenditure was £31,056, leaving a balance to credit of profit and loss account of £9367. This amount has been appropriated as follows: In payment of a dividend of 8 p.ct. for the year, £3776; transfer to special purposes fund, £645; and transfer to reserve fund, £2500—making a total of £6921, and leaving a balance to be carried forward of £2446. The revenue account shows that the expenses of the manufacture of gas were £18,351; distribution of gas, £6520; public lamps, £371; rent, rates, and taxes, £1611; and management, £2115; and the balance carried to the profit and loss account is £10,781. On the income side, £20,418 was received from private consumers; £1118 from public lighting, &c.; £426 from rental of meters and stoves; and £8528 from the sale of residual products.

CROYDON.

As compared with 1926, the sale of gas shows an increase of 3·89 p.ct.; and during the year the number of consumers has increased by 3442. After deducting June dividends (at the rate per annum of 7½ p.ct. on the preference stock, 5 p.ct. on the maximum dividend stock, and 6½ p.ct. on the sliding-scale stock), providing for all fixed charges, and carrying £6889 to reserve fund, £10,000 to renewal fund, and appropriating £10,000 to the pension fund, there remains for division a balance of £56,823. The Directors recommend that dividends be declared for the half-year ended Dec. 31, 1927, at the following rates per annum, less tax: On the preference stock 7½ p.ct., on the maximum dividend stock 5 p.ct., and on the sliding-scale stock 7 p.ct. This will leave a balance of £14,681 to be carried forward.

DURHAM.

At the annual meeting of the City of Durham Gas Company it was reported that there was an available balance of £5414, after deducting the interim dividend; and the usual half-yearly dividends of 5 p.ct. on the original capital and 3½ p.ct. on the additional capital were approved. The price of gas, which was increased by 5d. per 1000 c.ft. for the December quarter, 1926, was reduced by a like amount from Jan. 1, 1927, and the price was further reduced by 2½d. per 1000 c.ft. from last June quarter. The Directors intend to make another reduction of 2½d. per 1000 c.ft. (or ¼d. per therm) from the March reading of the meters.

GRANTHAM.

At the half-yearly meeting on Feb. 7, the Directors reported a balance on the profit and loss account of £8466, out of which they recommended the payment of the statutory dividend of 5 p.ct. per annum on the consolidated stock, less tax, the placing of £2000 to the reserve, and the carrying forward of the balance to the next half-year. In consequence of the favourable balance-sheet, they announced that, in addition to the reduction of 6d. per 1000 c.ft. in the price of gas made as from April 1 last, and the further one of 4d. per 1000 c.ft. from Oct. 1, they felt justified in making a further reduction of 2d. per 1000 c.ft., equivalent to ¼d. per therm, as from April 1 next. This will lower the price to 4s. 8d. per 1000 c.ft., which is 2d. below the price prevailing before the coal strike of 1926. The report was adopted.

ILFRACOMBE.

Presiding at the annual meeting, on Feb. 15, of the Ilfracombe Gas Company, Mr. R. M. ROWE, Chairman of Directors, stated that during the past year 7300 tons of coal had been carbonized—300 tons more than in the previous year—at a cost of £10,722, compared with £14,607 in 1926. The sale of gas during the past year, amounting to 92 million c.ft., was a record. As from Christmas last, the price of gas had been reduced by 1d. per therm. The possibility of a further reduction in the near future was indicated. The full statutory dividend of 5 p.ct. on the preference shares, and a dividend of 6 p.ct. on the consolidated ordinary shares, were declared.

NEWPORT.

Presiding at the annual meeting of the Newport Gas Company, Mr. G. GEEN, J.P., said that since the first accounts of the Newport electricity undertaking were published, the Newport Gas Company had contributed to the Newport rating authorities the sum of £92,701. This was approximately £40,000 more than had been paid by the electricity undertaking, both as rates and as contributions in relief of rates, for the same period. The accounts for the past year had been inevitably affected adversely by the prevailing industrial conditions, and by the aftermath of the disastrous coal stoppage of 1926; but, notwithstanding these circumstances, the profit earned was sufficient to pay the customary dividend at the maximum rate, as well as the usual interest charges, and to carry forward a small balance of £204.

Extensive building development in the Company's area of supply had again necessitated a considerable outlay on mains, services, meters, stoves, and kindred appliances. There was a net increase of 621 in the number of consumers on the Company's books, and the total of such consumers was now 18,570. The temporary increase in the price of gas, which came into force in September, 1926, following upon the high price that had to be paid for coal, was withdrawn in March last, when the price reverted to that which obtained in the pre-stoppage period. Rates had again increased by £376 to a sum of no less than £5385. A point to be noticed was the steadily decreasing revenue from public lighting within the boundaries of the County Borough of Newport, due to the declared policy of the local Council to substitute electricity for gas for this purpose, wherever possible. In consequence, the number of public lamps lighted by gas was now only a third of what it was in 1904. It was understood that the responsible Committee had called for drastic reductions in the cost of this service, and he would submit that such a reduction could be readily obtained by a return to the earlier form of illuminant, and that by reverting to gas a greater measure of efficiency would be obtained. The Company had secured recently the public lighting contracts in two districts immediately outside the Borough boundary, in open competition with electricity tenders.

The returns from residual products showed an improvement on the preceding year. Since the Company undertook the delivery of coke to customers' premises, there had been considerable expansion in local sales: and every endeavour was being made to increase this business. Tar was largely used in the town, and by local district councils, for road spraying purposes; but apparently it had been abandoned by the County authorities for the past two years in favour of bitumen. That preference for a foreign commodity, when the alternative of tar was a product of locally produced coal, was unaccountable, especially when one considered the large number of representatives on the Council in question who were closely identified with the coal mining industry. There was a further consideration, that tar had many advantages over its rival, whether as a surface dressing for roads, or as tar macadam.

Doubtless their attention had been drawn to the threatened action of the Cardiff Corporation with regard to tenants on their Fly and Mynachdy estates, who persisted in using gas for lighting in preference to electricity; and probably they had shared in the widely-expressed indignation at the unwarrantable interference with the liberty of the subject indicated by such proceedings. In that connection it would have been observed that their Company's action in obtaining the insertion of a protective clause in the Newport Corporation Act of 1925, which gave tenants of the Corporation liberty of choice in the matter, had been quoted with approval and with point. It cannot be too widely known, said the Chairman, that no restrictions as to the form of light, heat, power, or energy to be used could be imposed by Newport Corporation upon the tenants of any property acquired or called into being by them after the passing of the Act; and it was satisfactory to find that this considered judgment of a Parliamentary Committee, which was obtained upon the initiative of this Company, was proving of such advantage to the community at large, and to the gas industry as a whole.

In conclusion, he had again to acknowledge with appreciation the services of the Company's officials and staff. They were greatly indebted to Mr. Canning and Mr. Stanford, and to those associated with them, for their able assistance in the administration of the Company's affairs throughout the year.

Councillor C. F. WILLIAMS formally seconded, and the report and accounts were unanimously adopted.

Mr. J. H. CANNING, O.B.E., the Engineer and Manager, stated that every demand upon the staff had been willingly and cheerfully met, and the workmen had responded in like manner. To them was due a great deal of the success they were experiencing at present. The point in the Chairman's address, in relation to the freedom of the subject, touched not only the interests of their Company, but public interests all over the country. They had vindicated the right of the public to employ whatever agent desired for heat, light, and power: and the public should see to it that they were allowed to exercise that freedom just the same as under the ordinary private landlord. The Gas Company asked for no favours, but simply to be allowed to compete freely and legitimately. In such circumstances

they would have nothing to fear in the future, especially with a revival in trade contemplated.

Mr. W. STANFORD, the Secretary, made reference to the fine spirit of co-operation among the servants of the Company.

PORTSMOUTH.

The general meeting of the Portsmouth Gas Company was held on Feb. 16. Mr. T. H. F. LAFTHORN, J.P. (Chairman of Directors), proposing the adoption of the report and accounts, said that the receipts from gas were better by £26,529. The output was increased by 123 million c.ft. The revenue from coke was greater by £9568, due to an increase in the sales of 13,694 tons. The remainder of the residuals accounted for an increase of £6713. They had earned a gross profit of £71,069—an increase of £11,405 compared with the previous year. After payment of the usual charges and income-tax, they had an available balance of £61,909; and the dividend they recommended would take £22,329, leaving a balance to bring into this year's account of £39,580—£3783 more than last year. He had given them the figure of the increase in the sales. Stated in percentage, it was 5·18; or, if they made the necessary allowances for the fact that Havant had been included for the whole year and Emsworth had been included for three months, the increase in the rest of their area was well over 4 p.ct. The meters in use now numbered 61,630—an increase of 4·26 p.ct.; and the number of appliances was 71,914—an increase of 4962.

He had pleasure in announcing a reduction in the price of gas of ½d. per therm—from 8d. to 7½d. This would operate in the case of ordinary consumers from the next reading of the meters, and in the case of prepayment consumers from the first regular clearance of their meters after March 31. In addition, they were increasing the discount to their large domestic consumers. The discount would be 5 p.ct. on the excess consumption over 450 therms up to 2250 therms; 7½ p.ct. on the excess consumption over 2250 up to 4500; and 10 p.ct. on the excess consumption over 4500. These increased discounts would take effect from April 1.

They were recommending a small increase in the dividend on the consolidated stock; the increase being 6s. p.ct. That increase would take £1273 in a year; and on March 1 they would pay a consolidated stock dividend of £3 18s. p.ct. This dividend, added to the interim dividend of £3 12s. p.ct. paid on Sept. 1 last, would make the dividend on that stock 7½ p.ct. for the year.

The report also referred to a life insurance scheme which they had established for the benefit of the dependents of their employees. Though the cost of the scheme would be appreciably less than the cost of the pensions scheme, their men appreciated it even more than they did the latter; and the reason was a very creditable one—the insurance scheme would benefit their dependents, while the pensions scheme benefited themselves.

Again they had had a year's working without any friction or trouble, and their thanks were due to the whole of their employees for the loyal way in which they had worked and helped them to produce the satisfactory results. He would particularly mention Mr. H. A. Stibbs and Mr. T. Carmichael, and in regard to the latter he was sure they would like to join in congratulating him on an honour which had just been conferred upon him. At the annual meeting of the Institution of Gas Engineers, held last June, Mr. Carmichael read a paper on "Modern Carbonizing Economics," and he had been awarded a gold medal for that paper. [Applause.]

Mr. WILLIAM GILLMAN, J.P. (Deputy-Chairman), seconded, and the report and accounts were adopted unanimously.

Mr. STIBBS (Secretary) and Mr. CARMICHAEL (Engineer) returned thanks on behalf of themselves and their respective staffs; and both speakers emphasized the loyalty of the employees to the Company.

SCARBOROUGH.

The annual meeting of the Scarborough Gas Company was held on Feb. 11. Mr. W. S. ROWNTREE (Chairman), who presided, said he was sure all would consider the accounts for the past year highly satisfactory. Though it would be futile to attempt to compare the results with those of the year 1926—the period of the disastrous coal strike—it was a matter for congratulation that they had been able to put back to the reserve account nearly £4000 of the amount withdrawn at that time, and after providing for all interest charges, dividends, &c., to carry forward a small balance. The amount of capital expenditure on mains, meters, and stoves was indicative of the further expansion of the Company's business. The pleasing feature in this respect was that, owing to the continued increase in the sale of gas, the capital expenditure per 1000 c.ft. sold was lower than ever, being 12s. 7d., as compared with 13s. 9d. five years ago, and a pre-war figure of 15s. During the past year the sale of gas had increased by 22 million c.ft. In the last five years the increase amounted to 137 million c.ft.

During the year there was an increase of 354 in the number of consumers, bringing the total to 13,938. The sale and hire of appliances had continued on a satisfactory scale; and during the year 614 cookers, 400 fires, 300 washing coppers, and sundry other appliances were fixed. These figures showed that the past year had been one of great activity, and augured well for the continued prosperity of the undertaking.

On the proposition of the CHAIRMAN, seconded by Mr. G. A. MOORHOUSE, the maximum dividend of 5 p.ct., less tax, was approved.

Mr. PHILIP ALAN (Secretary and Manager), replying to a vote of thanks to the staff, confessed that the year's results were a surprise to him. They got a very large increase in 1926, during the strike, when people were burning gas because they could not obtain coal; and he expected when the corresponding time came in 1927, they would lose ground or only just hold their own. In the second half of 1926 there was an increase of 18 millions, and in the second half of 1927 they not only kept that up, but increased by a further 5 millions.

Following the ordinary meeting, there was a special meeting, which the CHAIRMAN explained had been called for the purpose of sanctioning borrowing powers, amounting in the whole to £45,277, being the balance now remaining and authorized under their 1927 Act. Sanction was granted without discussion.

SUTTON.

Presiding at the annual meeting of the Sutton Gas Company on Feb. 16, the Chairman of Directors, Mr. EDWARD J. HOLLAND, D.L., J.P., referred with regret to the death, in December last, of Mr. Humphrey J. Bracey, who for many years had rendered services of great value to the Company. To fill the vacancy on the Board the Directors had appointed Mr. E. Morris Gibson, who for some time past had acted as the Company's legal adviser. After the difficulties and upheavals of the last few years, continued Mr. Holland, and the trouble caused by the coal strike in 1926, it was a great pleasure to report that the conditions of 1927 were more normal, and that the results of the year's working were extremely satisfactory. During the year, 34,750 tons of coal had been carbonized, which represented an increase of 1000 tons on the amount treated in 1926. The sales of gas, at 428,724,200 c.ft., were the highest in the history of the Company, and represented an increase of no less than 7½ p.ct. on those of 1926, which was remarkably good considering that 1926, the year of the coal strike, was marked by an abnormal demand for gas. During the first half of the year the price was 10d. a therm, and for the last six months 9½d.; but in spite of these decreases in price, the amount received during 1927 was greater by £5000 than that received in 1926. The sales of coke were less by £8440, but the amount received for tar was greater by £2000. The net result was a profit of £24,000.

Continuing, Mr. Holland said that the Company had been able to arrange for the purchase of coal until June, 1929, at favourable rates; and this had justified them in reducing the price of gas to 9d. per therm, which, he thought they would all agree, was a highly satisfactory price for a gas undertaking situated as was the Sutton Company, away from the coalfields and having to transport all their coal from the docks by road. The Directors, too, had decided to make the price of gas uniform throughout the area supplied by the Company. For some time past the price in the Worcester Park and Banstead districts had been greater than that obtaining in Sutton by 4d. per 1000 c.ft., though the Company were in fact entitled to charge an additional 6d. in these areas.

During 1927, they had spent a considerable amount on capital account, due to two facts. During the war and in the years following it, the Company had been unable to expend money satisfactorily. The work of reconstruction had consequently been deferred until a more opportune time. Recently it had been necessary to spend a good deal on this work; but taken over a number of years the expenditure of capital had been on a most conservative basis. Secondly, during the last six years the increase in the sales of gas amounted to as much as 45 to 50 p.ct. It was obvious that, to cope with such rapid growth, they must spend capital. There had, however, been no disparity between the capital expenditure and the rate of progress of the undertaking; and to-day the capital stood at a figure below £500 per million c.ft. of gas sold. [Applause.] During the last year they had laid nearly eight miles of new mains, and they had added a further 863 consumers to their books. Also during the year they had issued £15,000 ordinary stock, and had raised 5 p.ct. perpetual debenture stock to the extent of £13,915. The average price of the stock, which issue was largely over-subscribed, was £110 6s. per £100. The debentures, which were offered at 97, were also largely over-subscribed. During 1927 a new messroom had been erected on the works for the men; and the showrooms had been enlarged and greatly improved. These showrooms were a credit not only to the Company, but also to the town. Concluding his remarks, Mr. Holland said that the success of the Company was due to excellent co-operation between staff and employees.

Mr. J. FERGUSON BELL, M.Inst.C.E., seconded the adoption of the report and balance-sheet, which motion was carried unanimously.

Mr. JOHN JONES proposed the adoption of a final dividend of 4 p.ct., making 8 p.ct., less income-tax, for the year. This was seconded by Mr. ARTHUR STEVENS, and carried *nem. con.*

Then followed an Extraordinary Meeting, as a result of which the Directors were authorized to issue the balance of stock capital remaining to be issued under the provisions of the Sutton Gas Order, 1922, amounting to £15,000, and the balance of the loan capital, amounting to £18,503, under the provisions of the Sutton Gas Act, 1904, and the Sutton Gas Order, 1922.

The meeting was brought to a close by votes of thanks to the Chairman and to the officers of the Company, to which Mr. HOLLAND, Mr. HENRY GAGE (Engineer and Manager), and Mr. H. W. CARPENTER (Secretary) responded.

WELLINGBOROUGH.

The profit, after providing for interest, amounts to £4389. This, added to the balance of £4358 brought forward from last account, makes an available balance of £8747. The Directors recommend that out of this sum dividends of 7½ p.ct. on the original shares and 6 p.ct. on the additional shares, less income-tax, be declared for the half-year ended Dec. 31. The payment of dividends and tax will absorb £3846, leaving £4901 to be carried forward.

WHITCHURCH (SALOP).

Sales of gas increased by nearly 2 p.ct., and a final dividend of 6 p.ct. (less tax) has been declared.

YEADON AND GUISELEY.

Presiding at the annual meeting of the Company on Feb. 8, Mr. Thomas Parsons (Chairman) said that the profit for the year was £5521, while the balance of net revenue brought forward was £5738, making a total of £11,259. The Directors recommended a dividend at the rate of 7½ p.ct. per annum, less tax, on "A" stock, amounting to £850, and a dividend of £5 1s. 6d. p.ct. per annum, less tax, on "B" stock, amounting to £1502, leaving a balance to be carried forward of £5706. The report and balance-sheet were adopted.

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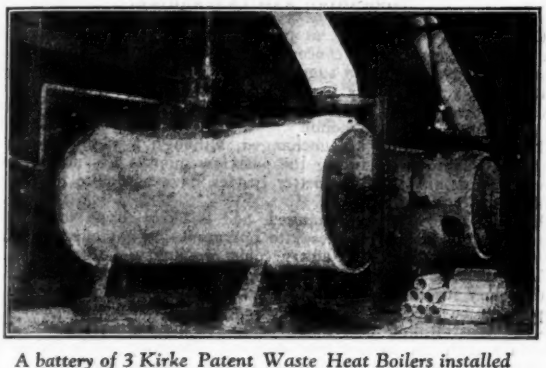

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VENTILATION OF BATHROOMS AND GEYSERS.

Bye-Laws at Bristol.

In the "GAS SALESMAN" for May 25 last year, it was announced that Section 86 of the Bristol Corporation Act, 1926, made it illegal for anyone to instal in the city geysers without flue-pipe. The section is as follows:

(1) Section 157 of the Public Health Act, 1875, shall be extended so as to enable the Corporation to make bye-laws with respect to the following matters: For requiring notice to be given of the erection or formation of bathrooms, or the fixing of geysers or other hot-water apparatus in connection with bathrooms, and for securing that proper ventilation shall be provided for such apparatus, and for any such apparatus fixed before the passing of this Act or the making thereunder of any bye-law relating to such matter.

Under that section the Corporation have since made the following bye-laws, which it is understood the Minister of Health is prepared to confirm:

For Securing that Proper Ventilation shall be Provided or Geysers or other Hot Water Apparatus fixed in connection with Bathrooms, and for any such Apparatus fixed before the making of these Bye-Laws.

(1) Every person who shall fix in connection with a bathroom, whether in the bathroom or in an adjoining room or place having immediate access thereto, a gas appliance for heating water for the purpose of supplying a bath, shall cause such room or place to be provided with a window or windows opening directly into the external air and of a total superficial area of not less than 4 ft. exclusive of the frame, or with some other equally suitable means of ensuring thorough and efficient ventilation.

(2) Every person who shall fix in connection with a bathroom whether in the bathroom or in an adjoining room or place having immediate access thereto, a gas appliance for heating water for the purpose of supplying a bath, shall cause such gas appliance to comply with the following requirements:

(*a*) It shall be provided with a pipe or trunk of adequate dimensions properly and securely fixed in such a manner and in such a position as to carry off to the external air any fumes arising from such gas appliance.

(*b*) Such pipe or trunk shall be properly fitted with a suitably constructed baffle as high as possible in the bathroom or other place in which the gas appliance is fixed, and with a cowl or similar suitable appliance at the extremity of such pipe or trunk in such a manner as effectively to prevent any down draught.

Provided that if the aforesaid gas appliance for heating water for the purpose of supplying a bath shall be of the boiler type, and not of the geyser rapid water-heating type, it shall suffice if, in lieu of the pipe or trunk referred to, suitable and sufficient means of effectually disposing of any fumes arising therefrom shall be provided.

The foregoing bye-law shall apply to every bathroom in connection with which a gas appliance for heating water for the purpose of supplying a bath is fixed, and to every such appliance fixed in connection with a bathroom, whether the appliance shall have been fixed before or after the passing of the Bristol Corporation Act, 1926.

Provided that no proceedings shall be taken to enforce the said bye-law against any person in respect of any such appliance fixed before the date of the confirmation of the bye-law, unless and until a notice in writing has been served by the Council upon him, personally or by registered letter addressed to his usual or last known residence or place of business, requiring him within a period specified in the notice to comply with the bye-law, and he has failed to do so.

OIL FROM COAL.

Britain's Future.

At the Hotel Cecil on Feb. 15, Dr. PAUL DVORKOVITZ—who has been associated with the oil industry since 1879, and with the coal industry since 1893, and regarding whose process of extracting oil from coal by low-temperature distillation an article was published in the "JOURNAL" for Jan. 18, p. 145—gave his views on the present situation in these industries.

Devoting his attention first to the position of the coal industry Dr. Dvorkovitz observed that in 1927 the world's production of coal was above 100 million tons more than in 1926. The production in England and Scotland was nearly 250 million tons last year. It was clear, he went on, that something would have to be done to help this basic industry, which a memorandum presented by the Midland coalowners showed to be most unfavourably placed. The cost per ton raised in this country averaged 15s. 3d., while the disposal price was only 14s. 1d. In other words, the average loss on every ton raised was 1s. 2d. They had heard lately that the German coalowners were anxious to come to some arrangements with the British coalowners for marketing purposes and control of prices. He believed, however, that such a suggestion, coming from the German coalowners, who were effectively organized for distribution and production, would not help matters here. Self-help principles alone would solve the difficulties. There ought to be an organization for marketing the coal produced in England, and funds should be raised for the purpose of introducing mechanical improvements for coal raising, sorting, and, in a great many cases, washing.

At present, continued Dr. Dvorkovitz, there were 50 million tons of coal lost in the form of slack and smalls. It had been suggested that some of this should be utilized for electricity generation. A further idea was to extract petroleum from the coal, and use the residue as smokeless fuel, as powdered fuel, or for transforming into gas. The extraction of petroleum from coal would create an enormous industry, which would help to place the coal industry on a better footing. At least 15 gallons of oil could be produced per ton of coal treated. In other words, at least 750 million gallons of oil could in the near future be produced for home consumption by the utilization of waste coal, which would increase the value of the coal raised by 3s. a ton, in addition to the value of the bye-products.

Turning to the question of the oil industry, Dr. Dvorkovitz said that the present total world production of crude oil in 1927 was 1254

million barrels—156 million barrels more than in 1926. Of this, the United States accounted for practically 75 p.ct. of the total. Up to the middle of last year, the four important groups marketing the oil were the Standard Oil Company, Ltd., the Shell Company, the Anglo-Persian Oil Company, Ltd., and Russian Oil Products, Ltd. Great Britain had been a favourable market for all these distributors; the imports in 1927 amounting to 2051 million gallons. These four large importers developed their trade in this country and organized the supply of motor spirit satisfactorily. However, the Standard Oil Company, having in view the possibilities of securing a concession from the Russian Soviet, had established a large refinery at Batum; and a 10-in. pipeline from Baku to Batum was in course of construction, as well as one from Grosny to Tuapse. Thus the Russian export trade would be placed in a highly favourable position. The combination of the Standard Oil Company with the Soviet would create such competition that a price war would be inevitable, and would react greatly on the petroleum companies which had spent enormous capital in developing the oilfields and markets in the Far East. By having practically secured the monopoly of the export oil from Russia, the Standard Oil Company were controlling practically one-third of the total oil resources in the world. Moreover, the combination constituted a definite political threat to the whole of the British Empire, so far as its crude oil supplies were concerned.

Dr. Dvorkovitz concluded by asking whether it was not time that some support should be given to combat what he regarded as unfair competition in the home markets. Great Britain and the Empire, he said, had it within their power to make themselves independent of all alien sources of supply in a very short time, by an intelligent policy of co-operation between British-controlled oil companies and the application of scientific methods in the production of oil from the rich deposits of British coal.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 20.

The position of pitch remains practically the same as recorded last week, and very little business is reported.

Creosote continues steady at about 8¾d. per gallon.

Tar spirits are unchanged, pure benzole being 1s. 5d. to 1s. 6d. per gallon, pure toluole about 1s. 10d. per gallon, 95/160 solvent naphtha 1s. 3d. per gallon, pyridine about 6s. per gallon.

Tar Products in the Provinces.

Feb. 20.

Tar products markets still remain quiet.

The market for pitch is quiet, and there is little or no business to report.

Creosote is steady, and a fair amount of business is being done at round about existing prices.

Tar acids are still very firm indeed, and high-grade cresylics are fetching high prices.

Water-white products are still very dull owing to the competition of petroleum products.

The average prices of gas-works products during the week were: Gas-works tar, 44s. to 49s. Pitch—East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, 52s. 6d. to 55s.; Liverpool, 55s. to 57s. 6d.; Clyde, 57s. 6d. to 60s. Benzole, 90 p.ct., North, 11½d. to 1s. 0½d.; crude, 65 p.ct. at 120° C., 9d. to 9½d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 3d. to 1s. 4d. nominal. Coal-tar crude naphtha, in bulk, North, 7¾d. to 8d. Solvent naphtha, naked, North, 8¾d. to 9¼d. Heavy naphtha, North, 8¾d. to 9¼d. Creosote, in bulk, North, liquid, 7¾d. to 7⅞d.; salty, 7⅞d. to 7¾d.; Scotland, 7¾d. to 7⅞d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 3d. to 2s. 4d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

CONTRACTS OPEN.

Meters.

The Manchester Corporation Gas Committee invite tenders for the supply of new, and the repair of old, meters. [See advert. on p. 508.]

Tar.

The Manchester Corporation Gas Committee invite tenders for the purchase and removal of gas tar and carburetted water gas tar. [See adverts. on p. 508.]

Oxide of Iron, New and Spent.

The Manchester Corporation Gas Committee invite tenders for the supply of new oxide of iron, and the purchase and sale of spent oxide. [See advert. on p. 508.]

Stores, Tools, &c.

The Borough of Ossett invite tenders for tools, stores, &c., required in connection with their gas, lighting, and other departments [See advert. on p. 509.]

Steam Engines and Exhausters and Pump.

The Newbury Corporation gas undertaking invite tenders for the supply of steam engines and exhausters and horizontal steam pumps. [See advert. on p. 509.]

Low-Temperature Carbonization.—It is announced that a further battery of retorts will be erected during the next three months by Low-Temperature Carbonisation, Ltd., at Barugh.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market has been quiet and dull during the past week. Inquiry from abroad is extremely slow, and quoted prices are reported to be too high to bring business. There is a general idea that foreign consumers are expecting all-round price concessions as a result of the reduction in costs which will come with the wage cuts, and are consequently not buying at all at present. A determined attempt is being made on the part of the collieries to maintain prices at the present level, and especially in Northumberland an understanding has been reached among them. The proceeds of the saving are all required to enable the collieries to carry on at current prices.

Good gas coals are in fair demand; but other qualities are quiet and none too firm. Wear Specials quote 16s. f.o.b., and best qualities about 15s. 3d. Good seconds are 13s. 6d., and others obtainable down to 13s. Durham coking is quoted at 13s. 3d. to 13s. 9d., according to quality. Bunkers are easier in tone, best makes being 14s. 6d., and ordinaries 13s. 3d. to 13s. 6d. Northumberland best screened steams are quoting 13s. 6d. steadily; but little new business is forthcoming. Gas coke is quieter, but output is being steadily cleared at 22s. to 22s. 6d. f.o.b.

YORKSHIRE AND LANCASHIRE.

Gas coals are of interest at the moment in view of the fact that some of the consuming concerns are inclined to buy for delivery months in advance, which suggests that this form of fuel will appreciate in pit value. Many inquiries are now on the market, and the ultimate effect of the five counties scheme, which is due to operate as from March 1, is in doubt.

Industries generally are unchanged, although a slight attempt to stabilize washed fuels during the past few months has not been entirely successful, while the better grades have not quite maintained anticipated prices.

Export also remains unchanged, and is likely to do so until the Five Counties Scheme comes into operation. What effect this will have in regard to north-country coals remains to be seen.

The sales of domestic fuel are not considered by the trade as satisfactory for the time of the year. Electrical and gas appliances appear to be used to a greater extent than ever for domestic purposes. West Riding best house coals are moving very slowly, and ordinary fuels are in but poor demand. Bagging coals are chiefly in demand, but even orders for these are executed promptly.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 15s. to 15s. 3d.; screened gas coal, 15s. 6d. to 16s.; washed trebles, 16s. to 16s. 3d.; washed doubles, 14s. 9d. to 15s. 3d.; washed singles, 14s. 9d. to 15s. 3d.; washed smalls, 11s. 3d. to 11s. 6d.; smithy peas, 17s. 6d. to 18s. 6d. per ton.

West Yorkshire—Hartley's (f.o.b. Goole), 14s. 3d. to 15s.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 15s. 6d. to 16s.; washed doubles, 14s. 9d. to 15s.; washed singles, 14s. 3d. to 15s.; washed smalls, 10s. 6d. to 11s.; unwashed trebles, 14s. 9d. to 15s. 3d.; unwashed doubles, 10s. 9d. to 11s.; rough slack, 9s. 6d. to 10s.; coking smalls, 9s. to 9s. 6d. per ton.

Derbyshire and Nottinghamshire—Top hards, 15s. to 16s.; washed trebles, 15s. 6d. to 16s.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s. to 15s. 6d.; washed smalls, 11s. to 11s. 6d.; rough slack, 9s. 9d. to 10s. per ton.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. to 14s. 6d.; gas coke, 21s. 3d. to 24s. 3d.; furnace coke, 17s. 6d. to 18s. per ton.

In Lancashire, the demand for cobbles and nuts is improving, but that for best house coal is declining. Quotations are: Lancashire best house, 31s. to 32s.; seconds, 27s. to 28s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire selected house, 32s. to 33s.; best house 25s. to 27s.; cobbles, 18s. to 20s.; house nuts, 25s. to 27s.; washed doubles, 13s. to 14s.; washed singles, 12s. to 13s. in wagons at pit.

MIDLANDS.

Pits which produce a large proportion of house coal are now feeling the pinch more severely than those which cater for the industrial trade. Many of the collieries in the Cannock Chase and Warwickshire districts are working only three days a week. There has been a further giving way of prices. It does not apply all round; but collieries are willing to concede 6d. or so to clinch negotiations where anything like a tonnage is concerned.

In the industrial market there is no reaction. The hoped-for expansion does not materialize, however, and values are only maintained by keeping the balance between supply and demand. Though there is nothing approaching a glut of slack, the market is easy. Good nutty samples are offered down to 6s. at the pithead. Blast-furnace coke remains a weak feature. Purchases can be made at 12s. at the ovens, and prices lower than this are reported to have been accepted.

Gas-works are taking advantage of a buyers' market to conclude yearly contracts on favourable terms.

Reduction in Price at Douglas.—The Douglas Gas Light Company have reduced the price by 5d. per 1000 c.ft., making a reduction of 9d. since last October.

European Gas Company's Dividend.—The Board of the European Gas Company, Ltd., have decided, subject to audit, to recommend a final dividend for the year 1927 at the rate of 6s. per share, making a total of 10s. per share, or 5 p.ct., for the year, free of income-tax. The final dividend for 1926 was at the rate of 3s. per share, making a total of 6s. per share, or 3 p.ct., for the year.

STOCK MARKET REPORT.

UNSETTLED conditions prevailed on the Stock Exchange last week, and the business done was, in most of the markets, less than usual. Industrials still absorbed the main interest; but Home investments were quietly cheerful. The future monetary position was a restraining influence in the gilt-edged section; but given more settled conditions, substantial improvements in prices are anticipated.

There was considerable activity in the Gas Market, which, having regard to the excellent results of all the companies during the past year, is quite understandable. In most cases stocks are undervalued, and although any parcels placed on the market are speedily absorbed by the known gas stock investors, in the absence of outside interest prices continue on the low side. It will be seen by the table that the quotations of quite a number of capital stocks improved, the most noticeable being a rise of 3 points in Aldershot 5 p.ct. maximum. The price at which the Gas Light ordinary was done eased off slightly; the highest recorded being 19s. 4½d., as compared with 19s. 7½d. the previous week. The Newcastle and Gateshead Company has followed the lead of the premier company; and it will be seen that this Company's consolidated stock is now quoted at £1 stock. The average price on the Newcastle Exchange—16s. 6d.—compares with £80 prior to the change over, and the improvement is equivalent to a 3 p.ct. rise. Among the latest dividend announcements, both the Derby and the Sheffield Companies are recommending a higher distribution. The European Company also propose the division of 10s. per share, as compared with 6s. per share for the previous year. Another item of interest is the offer by the Colonial Gas Association, in the first instance to existing shareholders, of 54,291 £1 preference shares and 108,582 £1 ordinary shares at a premium of 1s. 6d. and 2s. respectively.

Issue.	Share.	When ex-Dividend.	Dividends, Prev. Hf.Yr	Dividends, Last Hf. Yr.	NAME.	Quotations. Feb. 17.	Rise or Fall on Week.	Transaction Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 9	5	5	Aldershot 5 p.c. max. C. .	70—75*	+3	70
412,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	69—72*	..	70½
1,551,868	,,	Sept. 29	7	7	Alliance & Dublin Ord. .	95—99	..	97½—99½
374,000	,,	Jan. 12	4	4	Do. 4 p.c. Deb. . .	64—67	..	66½
522,654	,,	Aug. 25	—	7	Barnet Ord. 7 p.c. . .	107—110	..	..
300,000	1	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/6—23/6	..	22/1½
170,000	10	Aug. 25	8½	8½	Bournemouth 5 p.c. . .	12½—13½	..	13
500,050	10	,,	7	7	Do. B 7 p.c. . .	12—12½	..	..
375,000	10	,,	6	6	Do. Pref. 6 p.c. .	10½—11½	..	..
50,000	Stk.	Jan. 12	3	3	Do. 3 p.c. Deb. .	58—59	..	..
164,025	,,	,,	4	4	Do. 4 p.c. Deb. .	75—78	..	..
357,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	112—115	..	..
341,800	,,	,,	—	6/8/6½	Do. 5 p.c. Con.	100—103	..	..
1,287,500	,,	July 28	5	5	Bristol 5 p.c. max. . . .	89½—90½a	+½	..
885,000	,,	Sept 29	7	8	British Ord.	112—115	+1	112—114½
100,000	,,	Dec. 22	7	7	Do. 7 p.c. Pref. . . .	114—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	72—75	..	74½
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb. .	93—96	..	..
100,000	10	Nov. 24	8	6	Cape Town, Ltd. . . .	8—9	..	..
100,000	10	Oct. 27	4½	4½	Do. 4½ p.c. Pref. . .	6—7	..	..
150,000	Stk.	Dec. 22	4½	4½	Do. 4½ p.c. Deb. . .	72—77	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord. . . .	100—103	..	..
287,860	,,	Jan. 12	7½	7½	Do. 7½ p.c. Red. Deb. .	101—104	..	..
157,150	,,	Aug. 11	6½	5	Chester 5 p.c. Ord. . . .	87—92b	..	..
79,185	1	Oct. 13	†2/-	†2/-	Colombo Ltd. Ord. . . .	31/—33/-	..	..
24,495	1	,,	1/4‡	1/4‡	Do. 7 p.c. Pref. . .	20/—22/-	..	..
321,490	1	Oct. 13	1/9‡	1/9‡	Colonial Gas Assn. Ld. Ord.	24/—26/-	..	..
173,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	+1/-	..
2,073,280	Stk.	July 14	—	5	Commercial Ord.	97—100	..	96½—99½
475,000	,,	Dec. 22	3	3	Do 3 p.c. Deb. . .	57—60	..	..
800,000	,,	Sept. 29	†1	†1	Continental Union, Ltd. .	28—33	..	2½
200,000	,,	,,	7	7	Do. 7 p.c. Pref. . .	90—95	..	..
787,560	,,	Aug. 11	6½	6½	Croydon sliding scale . .	104—105	+2	101½—103
403,100	,,	,,	5	5	Do. max. div. . . .	83—86	+1	83—85½
432,270	,,	Aug. 25	9	6	Derby Con.	108—105e	..	..
55,000	,,	Dec. 22	4	4	Do. Deb.	71—78e	..	..
209,000	,,	Aug. 25	5	5	East Hull Ord. 5 p.c. . .	78—81	..	78½—79½
50,000	,,	Dec. 22	5	5	Eastbourne 5 p.c. Deb. .	90—95	..	..
1,002,180	10	Sept. 29	†3	†4	European, Ltd.	8½—9½	+½	8½—9⅝
13,703,480	Stk.	Feb. 9	5	5/1/4	Gas Light & Coke 4 p.c. Ord.	19/1½—19/4½*	..	19/1½—19/4½
3,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. . . .	61—63*	..	62—63
4,157,040	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	77—80*	+1	77½—79½
5,602,620	,,	Dec. 22	3	3	Do. 3 p.c. Con. Deb. .	60—62	..	60½
181,315	,,	,,	6	6	Do. 6 p.c. Br'f'd Rd. Db.	101—104	..	102½
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	98½—100½	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb. .	..	..	..
82,500	,,	Aug. 25	6½	6½	Hastings & St L. 5 p.c. Conv	89—92	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	70—73	..	..
70,000	10	Oct. 18	†10	†10	Hongkong & China, Ltd. .	12½—13½	..	13½
173,200	Stk.	Aug. 25	5	5	Hornsey Con. 3½ p.c. . .	76—79	..	78
1,976,000	,,	Nov. 10	10	10	Imperial Continental Cap.	149—152	+1	149—152
223,130	,,	Feb. 9	3½	3½	Do. 3½ p.c. Red. Deb.	67—69*	..	68
235,242	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord. . .	96—99	..	..
2,145,907	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord. . .	89—91b	..	..
600,000	,,	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	103—105b	..	..
165,736	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap. . .	107—112	..	112
75,000	5	Dec. 22	†7	†8	Malta & Mediterranean .	5½—5⅝	..	5⅝
541,920	Stk.	Nov. 24	†7	†5	Montevideo, Ltd. . . .	92—94	..	..
2,061,315	,,	July 28	5	5	Newcastle & Gateshead Con.	16/3—16/9d	..	..
860,929	,,	,,	4	4	Do. 4 p.c. Pref. .	67½—68½d	..	..
691,705	,,	June 29	3½	3½	Do. 3½ p.c. Deb. .	66½—67½d	..	..
131,785	,,	Aug. 25	—	6/18/0	North Middlesex 6 p.c. Con.	93—96	..	93½
300,000	,,	Nov. 24	7	9	Oriental, Ltd.	116—121	..	..
188,120	,,	Dec. 22	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	102—105	..	..
236,732	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	..
2,334,464	1	—	—	—	Primitiva Ord.	20/6—21/6	..	20/7½—21/3
247,500	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb. . .	92—95	+2	91½
695,000	Stk.	Jan. 26	4	4	Do. 4 p.c. Red. Deb. 1911	74—76*	..	75½
423,183	,,	Dec. 22	4	4	Do. 4 p.c. Cons. Deb. . .	74—76	..	75½
160,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref. . .	8½—8⅝	..	..
125,000	50	Jan. 3	5	5	Do. 5 p.c. Red. Deb.	46—48	..	..
270,000	Stk.	Sept. 8	5⅜	5⅜	Sheffield A	102—104e	..	..
419,968	,,	,,	5½	5½	Do. B	102—104e	..	..
1,047,000	,,	,,	5½	5½	Do. C	102—104e	..	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,609,895	Stk.	Aug. 11	7	5	South Met. Ord.	106—108	+1	106—107½
500,000	,,	—	—	—	Do. 6 p.c. Irred. Pf.	110—113	..	..
1,895,445	,,	Jan. 12	3	3	Do. 3 p.c. Deb. . .	59—62*	..	60
784,360	,,	Sept. 8	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	..
91,500	,,	Aug. 11	8½	8½	South Shields Con. . . .	111—113d	..	..
1,243,795	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	105—108	..	..
368,837	,,	Dec. 22	5	5	Do. 5 p.c. Deb.	93—96	..	..
647,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max.	79—82	..	80½
121,276	,,	Dec. 22	4	4	Do. 4 p.c. Deb.	72—75	..	..
259,060	,,	Aug. 25	7	7	Swansea 7 p.c. Red. Pref. .	103—106	..	104½
200,000	,,	Dec. 22	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	..	..
130,000	,,	July 28	7½	7½	Tottenham District A 5 p.c.	110—115	..	..
882,525	,,	,,	6½	6½	Do. B 8½ p.c.	92—95	..	..
150,500	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
191,505	,,	Dec. 8	4	4	Do. 4 p.c. Deb.	74—77	..	74½
263,451	,,	Sept. 29	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	81—82d	..	..
269,034	,,	Aug. 25	6½	6½		90—93	..	..
83,500	,,	,,	5	5	Do. 5 p.c. pref. .	85—90	..	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	July 14	8½	8½	Wandsworth A 5 p.c. .	127—132	..	..
255,803	,,	,,	7	7	Do. B 3½ p.c. .	107—112	..	..
433,635	,,	,,	5/19/0	5/19/0	Do. C and New	94—99	..	98
352,902	,,	,,	6½	6½	Do. Wimbledon 5 p.c. .	102—107	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c. . .	110—115	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref . . .	88—93	..	..
88,175	,,	Dec. 22	3	3	Do. 3 p.c. Deb. . . .	56—59	..	..
284,782	,,	,,	4	4	Do. 4 p.c. Deb. . . .	75—78	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 98, 98½, Bournemouth 5 p.ct. 13, Commercial 99½, Croydon sliding scale 101½, maximum dividend 83, European 8½, 8⅝, Gas Light and Coke 19s. 1½d., 19s. 2d., 19s. 2¼d., 19s. 3d., 19s. 4¼d., 3½ p.ct. maximum 62½, 4 p.ct. preference 77½, Imperial Continental 149, 150, 152, 3½ p.ct. debenture 68, Malta and Mediterranean 5⅜, Ottoman 1s., Primitiva 20s. 9d., 20s. 10½d., 21s., 21s. 0⅜d., 21s. 1½d., South Metropolitan 106, 106½, 3 p.ct. debenture 60, Swansea 7 p.ct. preference 104½. Supplementary prices, Eastbourne 3½ p.ct. "B" 104, Farnham 11½½, 6 p.ct. preference 10, Malta and Mediterranean 7½ p.ct. preference 5, Metropolitan (of Melbourne) 9⅜.

On Tuesday, Aldershot 4 p.ct. preference 70½, Alliance and Dublin 97⅞, 97⅞, 97⅞, 4 p.ct. debenture 66½, British Gas Light 112, Commercial 98½, Continental Union 28½, Croydon sliding scale 100, maximum dividend 84, 84½, European 8½, Gas Light and Coke 19s. 1½d., 19s. 2¼d., 19s. 3d., 19s. 4½d., 4 p.ct. preference 77, 79, Imperial Continental 152, Primitiva 20s. 10½d., 21s., 21s. 1½d., 21s. 3d., 4 p.ct. debenture 75½, South Metropolitan 106½, 3 p.ct. debenture 60. Supplementary prices, Bournemouth 7 p.ct. debenture 102, Eastbourne 3½ p.ct. "B" 105, Farnham additional ordinary 11½½, 6 p.ct. preference 10, Malta and Mediterranean 7½ p.ct. preference 5⅛, Mid Kent 68s. 9d., Southend-on-Sea 4 p.ct. debenture 72.

On Wednesday, Alliance and Dublin 97½, 98, British 113, Croydon sliding scale 101½, maximum dividend 85½, European 8⅞, Gas Light and Coke 19s. 1½d., 19s. 2½d., 19s. 3d., 19s. 4¼d., 3½ p.ct. maximum 62, 62½, 63, 4 p.ct. preference 77½, 3 p.ct. debenture 60½, Hornsey 3½ p.ct. 78, Liverpool 7 p.ct. preference 103, Maidstone 5 p.ct. 112, North Middlesex 6 p.ct. 93½, Primitiva 20s. 9d., 20s. 10½d., 21s. 1½d., 4 p.ct. 1st debentures 91½, 4 p.ct. consolidated debenture 75½, South Metropolitan 106, Tottenham 4 p.ct. debenture 74½. Supplementary prices, Montevideo 6 p.ct. debenture 99, Southend-on-Sea 4 p.ct. debenture 73.

On Thursday, Commercial 96½, East Hull 5 p.ct. 78½, 79½, European 8⅞, 9, Gas Light and Coke 19s. 1½d., 19s. 2½d., 19s. 3d., 19s. 3¾d., 4 p.ct. preference 78, 78½, 79½, 6 p.ct. debenture 102½, Imperial Continental 149, Primitiva 20s. 9d., 20s. 10½d., 21s. 1½d., South Metropolitan 106, 3 p.ct. debenture 60, Southampton 5 p.ct. 80½, Wandsworth, Wimbledon, new ordinary 80. Supplementary prices, Aldershot 5 p.ct. debenture 98, Croydon 4 p.ct. debenture 77⅞, 78½, Hastings and St. Leonards 3½ p.ct. debenture 62, Pinner 5½ p.ct. debentures 100½, 100⅝, Redhill "B" 80, 81.

On Friday, Aldershot 70, Bombay 22s. 1½d., British 113, 114, 114½, 4 p.ct. debenture 72½, Commercial 98, Croydon sliding scale 103, maximum dividend 83, 84, European 8⅞, 8⅞, 8 11/16, 9, 9 1/16, Gas Light and Coke 19s. 1½d., 19s. 4¼d., 3½ p.ct. maximum 62½, 63½, 4 p.ct. preference 78, 78½, Hong Kong and China 13½, Imperial Continental 150, Primitiva 20s. 7½d., 20s. 9d., 20s. 10½d., 21s., South Metropolitan 106, 107½, 3 p.ct. debenture 60. Supplementary prices, Aldershot 4 p.ct. debenture 74⅝, 7 p.ct. Bonds 102, Farnham 5 p.ct. debenture 94.

The Bank rate is 4½ p.ct., and Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2½ p.ct. at call and 2⅝ p.ct. at notice.

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